بسم الله الرحمن الرحيم

مقابل هذا المجهود ارجو منكم الدعاء لي بالمغفرة ولابنائي الهداية والنجاح والتوفيق

أرجو ان يساعد هذا المجهود على مساعدة ابنائنا طلبة ال IGCSE الثانوية البريطانية وتحصيلهم على افضل واحسن واعلى الدرجات انشاء الله.
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IGCSE

Mathematics

Examination

PAPER

Good luck

2

(B)

June 1996 - Nov. 2003

UNIVERSITY OF CAMBRIDGE LOCAL EXAMINATION SYNDICATE
INTERNATIONAL EXAMINATIONS

Mathematics

contents

Centre Number | Candida Numbe

Candidate Name

International General Certificate of Secondary Education
UNIVERSITY OF CAMBRIDGE LOCAL EXAMINATIONS SYNDICATE

MATHEMATICS 0580/2, 0581/2

PAPER 2

Tuesday 4 JUNE 1996 Morning 1 hour 30 minutes

Candidates answer on the question paper.
Additional materials:
Electronic calculator
Geometrical instruments
Mathematical tables (optional)

TIME 1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces at the top of this page.
Answer all questions.
Write your answers in the spaces provided on the question paper.
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INFORMATION FOR CANDIDATES

The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 70.
Electronic calculators should be used.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answ to three significant figures. Give answers in degrees to one decimal place.

FOR EXAMINER'S USE

This question paper consists of 12 printed pages.

MFK (0075) OF66528

[Turn ove

1 Mario's heart beats 72 times per minute.

(a) Calculate how many times it beats in 1 year. [Use 1 year = 365 days.]

Answer (a) ..... [1]

(b) Write your answer to part (a) in standard form, correct to 2 significant figures.

Answer (b) ..... [1]

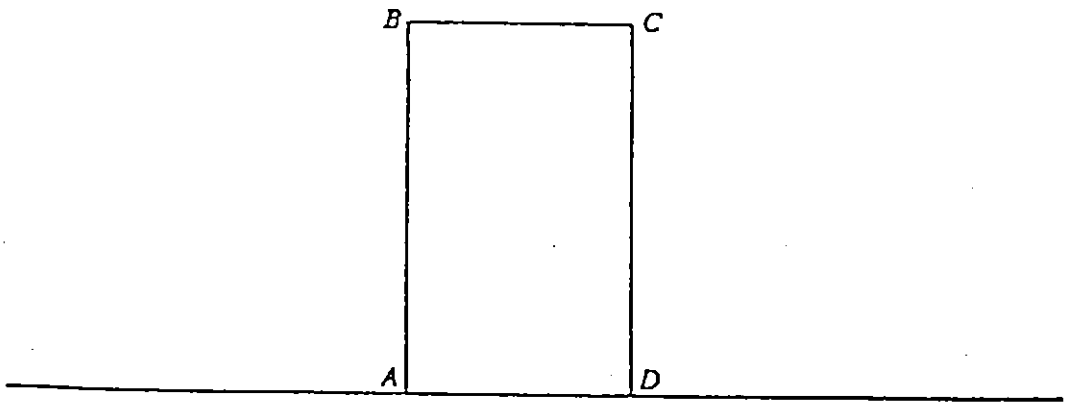
---

2 Solve the equation

$$3x + 17 = 21 - 5x.$$

Answer $x =$ ..... [2]

3



Draw accurately

(a) the new position of the rectangle $ABCD$ when you rotate it 90° clockwise about D. [1]

(b) the locus of the point B as it moves to its new position. [1]

4 $\frac{3}{17}$, $\frac{39}{233}$, $\frac{1}{6}$, $\frac{85}{512}$

Which of the fractions above is

(a) the smallest,

Answer (a) ..... [1]

(b) the largest?

Answer (b) ..... [1]

---

5 Eduardo arrived at the bus station at 10'19. His bus had left half an hour before.

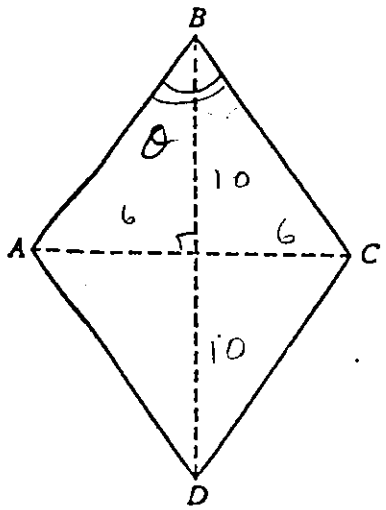
(a) At what time had his bus left?

Answer (a) ..... [1]

(b) Eduardo's next bus is at 1105. How long must he wait?

Answer (b) ..... minutes [1]

6



NOT TO SCALE

ABCD is a rhombus.
BD = 20 cm and *AC* = 12 cm.
Calculate the size of angle *ABC*.

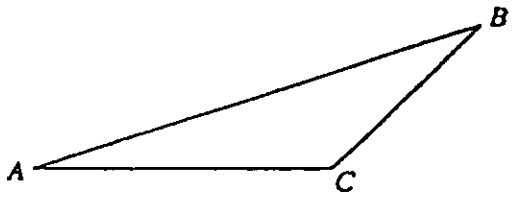
$\tan \theta = \frac{6}{10}$

$\theta = \tan^{-1}(\ldots)$

Answer Angle *ABC* = ... [2]

---

7 Draw accurately the reflection of triangle ABC in the line BC.



[2]

---

8 In 1995 Anna picked 150 kg of apples.
This was 20% more than she picked in 1994.
Calculate how many kilograms of apples she picked in 1994.

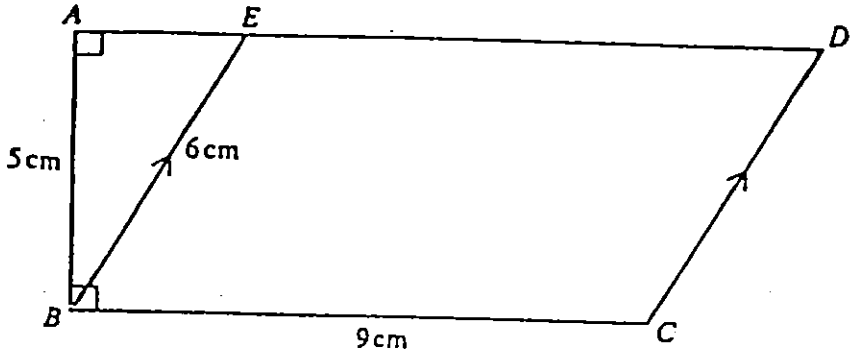
Answer ..... kg [2]

---

9 Sophia had a holiday in Italy when the exchange rate was 1 Swiss franc = 1105 lire.
She changed 1000 Swiss francs into lire. She spent 716 000 lire and changed the rest back into Swiss francs at the same rate.
Calculate how many Swiss francs she had left, to the nearest franc.

Answer ..... Swiss francs [2]

10



NOT TO SCALE

In the diagram, $B\hat{A}D = A\hat{B}C = 90°$. AED is a straight line and BE is parallel to CD. $AB = 5$ cm, $BE = 6$ cm and $BC = 9$ cm.

(a) What type of quadrilateral is $ABCD$?

Answer (a) ..... [1]

(b) Calculate the area of parallelogram $BEDC$.

Answer (b) ..... cm^2 [1]

---

11 (a) Multiply out $(3x + 2)(4x - 3)$ and simplify your answer.

Answer (a) ..... [1]

(b) Solve the equation

$$5x^2 - 31x + 6 = 0.$$

Answer (b) $x =$ ..... or $x =$ .....[2]

---

12 $\mathscr{E} = \{x : 2 \leqslant x \leqslant 8\}$, $A = \{\text{prime numbers}\}$, $B = \{\text{multiples of 3}\}$ and $C = \{\text{factors of 8}\}$.

(a) List the sets (i) $A \cap C$,

Answer (a)(i) $A \cap C = \{$.....$\}$ [1]

(ii) $(A \cup B)'$.

Answer (a)(ii) $(A \cup B)' = \{$.....$\}$ [1]

(b) Write down the value of $n(A)$.

Answer (b) $n(A) =$ ..... [1]

---

13 Make R the subject of the formula

$$P = \frac{Q + 3R}{T}$$

Answer $R =$ ..... [3]

---

14 A map has a scale of 1:50 000.

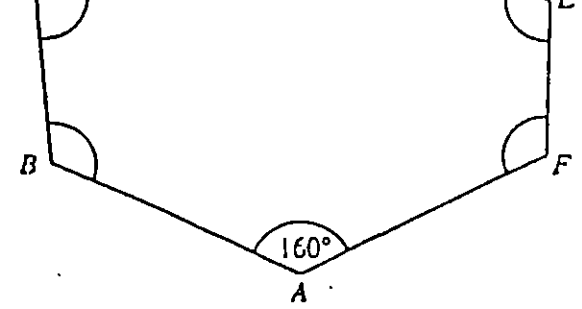
(a) A road on the map is 10 cm long. What is the real length of the road in kilometres?

Answer (a) ..... km [1]

(b) The area of a farm on the map is 6 cm^2. What is the real area of the farm in hectares?
[1 hectare = 10 000 m^2 = 0.01 km^2.]

Answer (b) ..... hectares [2]

15



NOT TO SCALE

In the hexagon $ABCDEF$, angle $BAF = 160°$.
The other 5 angles are all equal.
Calculate the size of angle CDE.

Answer Angle CDE = ... [3]

---

16 When $x = 27$, $y = \frac{1}{3}$ and $z = 2$, find the value of

(a) $8x^{\frac{1}{3}}$.

Answer (a) ..... [1]

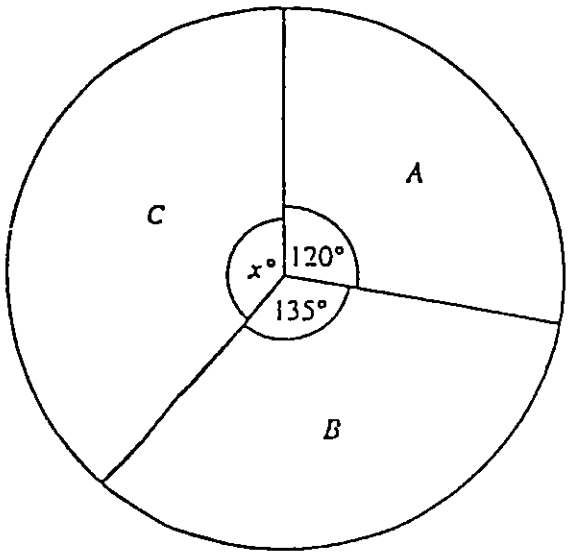
(b) $\left(\frac{y}{z}\right)^{-2}$

Answer (b) ..... [1]

(c) $(xy)^0$.

Answer (c) ..... [1]

17



NOT TO SCALE

In an election, people voted for parties *A*, *B* or *C*. The pie chart shows how the people voted.

(a) Calculate x.

Answer (a) $x =$ ..... [1]

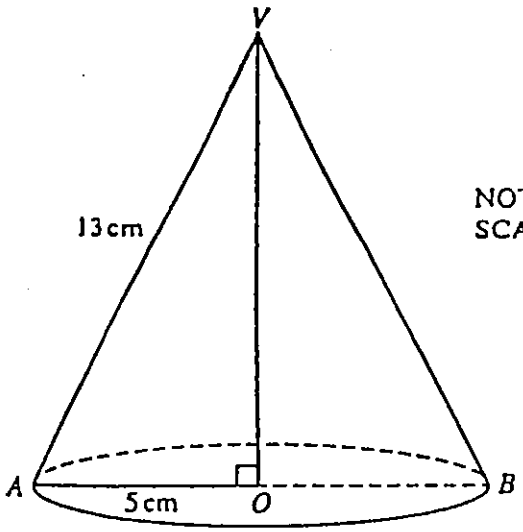
(b) What fraction of the voters voted for party *B*? (Give your fraction in its lowest terms.)

Answer (b) ..... [1]

(c) 720 people voted for party *A*. How many voted for party *B*?

Answer (c) ..... [1]

18



NOT TO SCALE

The diagram shows a cone with base diameter AOB and vertical height OV.
$AO = 5$ cm and slant height $AV = 13$ cm.

Calculate (a) angle VAO.

Answer (a) Angle $VAO =$ ..... [2]

(b) the curved surface area of the cone.
[The curved surface area of a cone, base radius r and slant height l, is πrl.]
[π is approximately 3.142.]

Answer (b) ..... cm^2 [1]

---

19 $f(x) = 3 + \sqrt{x}$ for $x \geqslant 0$.

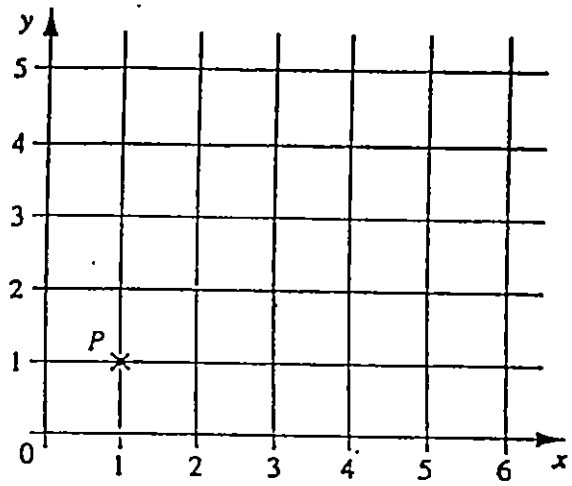
(a) Solve $f(x) = 7$.

Answer (a) $x =$ ..... [1]

(b) Find $f^{-1}(x)$.

Answer (b) $f^{-1}(x) =$ ..... [2]

20



P is the point (1,1). The vector $\mathbf{m} = \begin{pmatrix} 2 \\ 3 \end{pmatrix}$ and $\mathbf{n} = \begin{pmatrix} 1 \\ -1 \end{pmatrix}$.

(a) Find the vector $\mathbf{m} + 2\mathbf{n}$.

Answer (a) $\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [1]

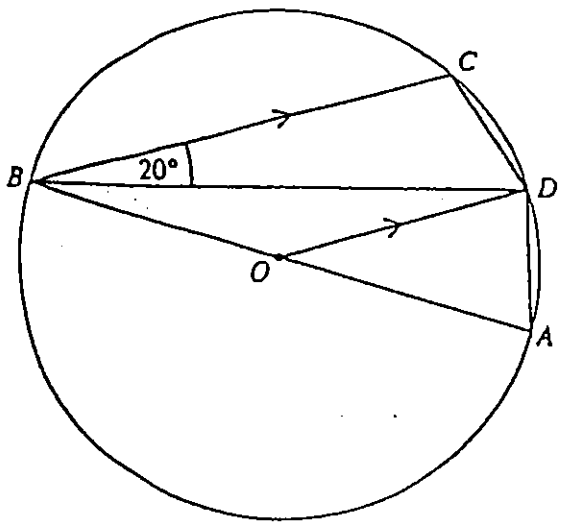
(b) $\overrightarrow{PQ} = \mathbf{m} + 2\mathbf{n}$. Find the position vector of Q.

Answer (b) $\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [1]

(c) Calculate $|\mathbf{m}|$, the magnitude of $\mathbf{m}$.

Answer (c) $|\mathbf{m}|$ = ... [2]

21



NOT TO SCALE

AOB is a diameter of the circle, centre O.
BC and OD are parallel. $C\hat{B}D = 20°$
Find (a) $B\hat{D}O$,

Answer (a) $B\hat{D}O$ = ... [1]

(b) $B\hat{D}A$,

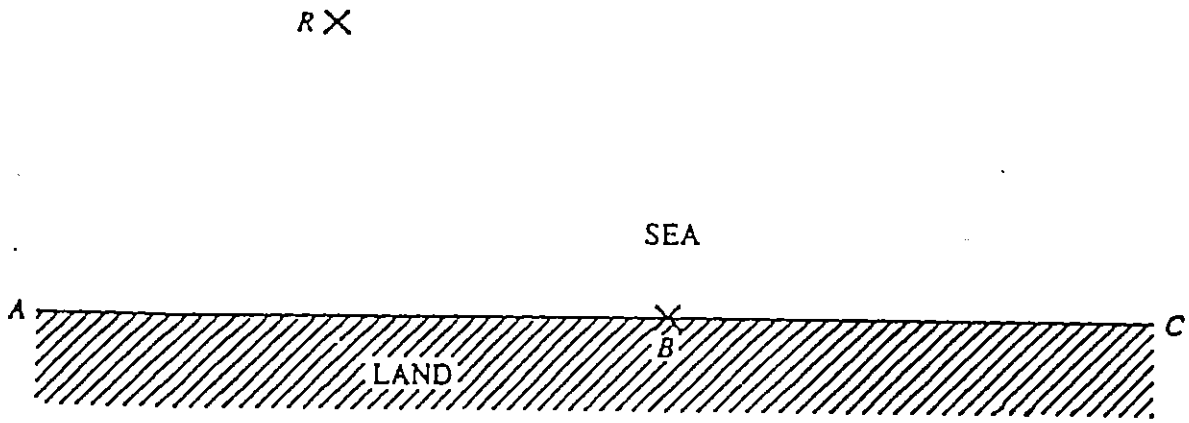
Answer (b) $B\hat{D}A$ = ... [1]

(c) $O\hat{A}D$,

Answer (c) $O\hat{A}D$ = ... [1]

(d) $B\hat{C}D$.

Answer (d) $B\hat{C}D$ = ... [1]



Mohammed anchors his yacht in a position which is less than 600 m from B, but more than 400 m from the coast ABC and more than 400 m from the rock R.

(a) Using a scale of 1 centimetre to represent 100 metres, construct accurately the locus of points

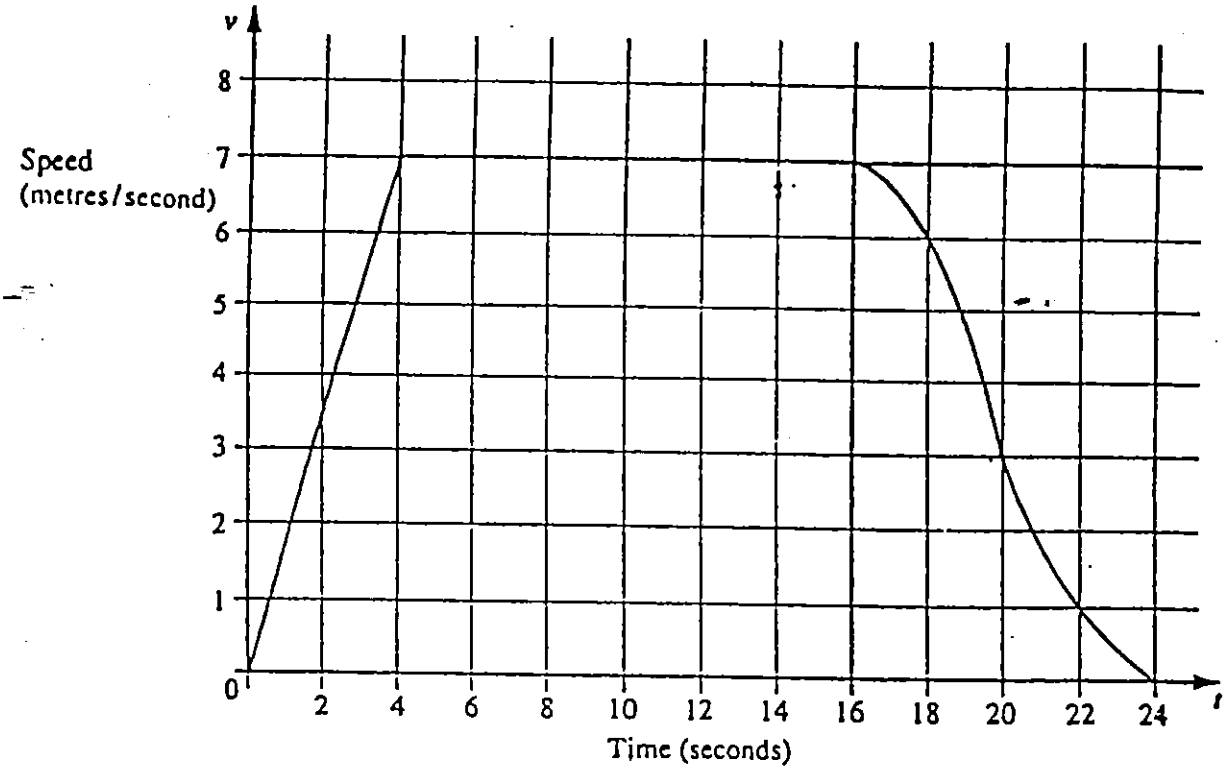
(i) 600 m from B, [1]

(ii) 400 m from the line ABC, [1]

(iii) 400 m from R. [1]

(b) On your diagram, mark a possible position, Y, for his yacht. [1]

23 198



The diagram shows a speed-time graph for a bicycle journey.

(a) Find the acceleration for the part of the journey
(i) during the first 4 seconds,

Answer (a)(i) ..... m/s^2 [1]

(ii) during the next 12 seconds.

Answer (a)(ii) ..... m/s^2 [1]

(b) Find the distance travelled during the first 16 seconds.

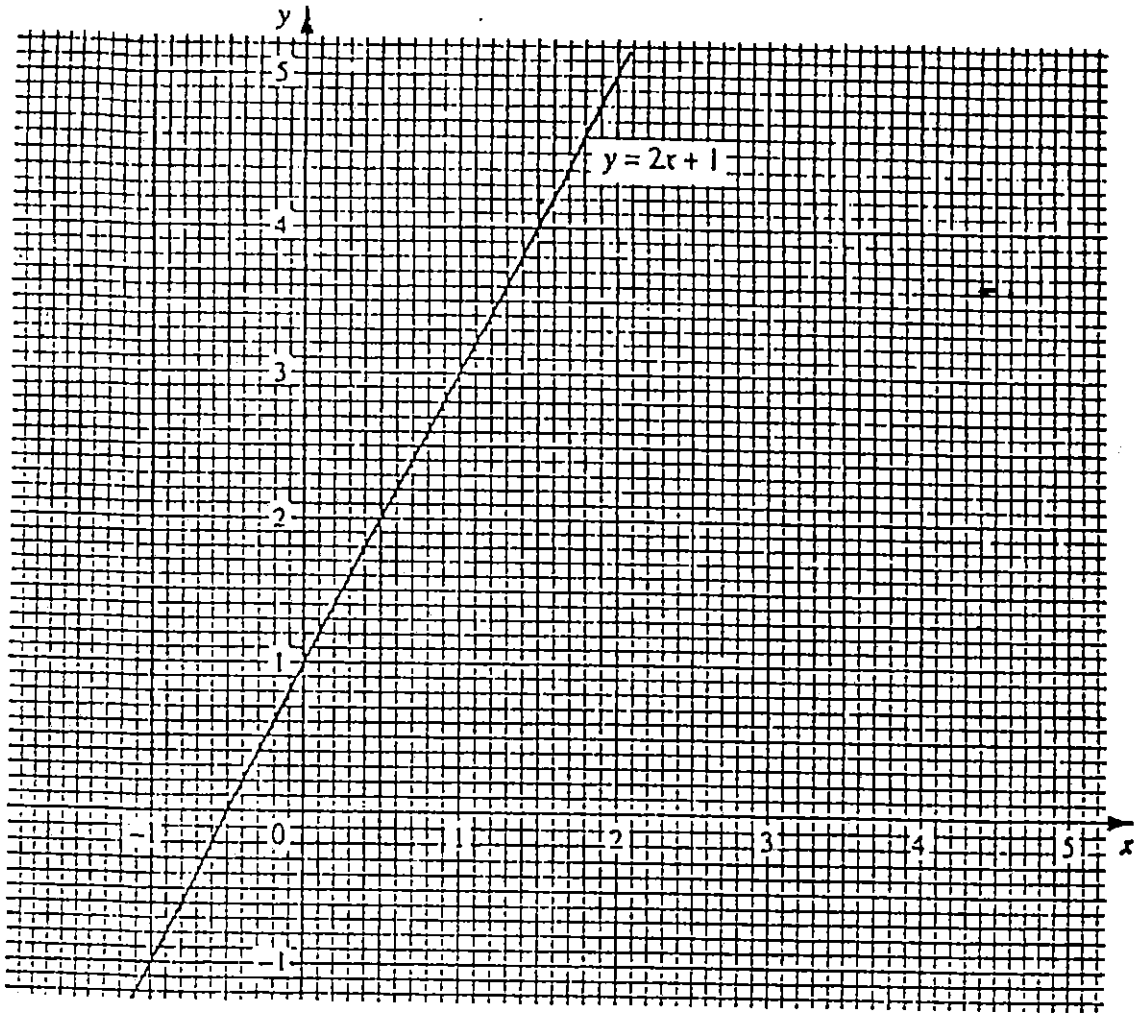
Answer (b) ..... m [2]

(c) Estimate the distance travelled during the last 8 seconds of the journey.

Answer (c) ..... m [1]

Question 24 is printed on page 12.

24



The line $y = 2x + 1$ is drawn on the grid.

(a) Draw the line $3y + 4x = 12$ on the grid. [2]

(b) Use the graphs to write down the solution of the simultaneous equations

$$y = 2x + 1 \quad \text{and} \quad 3y + 4x = 12.$$

Answer (b) $x =$ ....., $y =$ ..... [2]

(c) The region R satisfies the inequalities

$y \leqslant 2x + 1$,
$3y + 4x \geqslant 12$,
and $x \leqslant 2$.

Draw another line on the grid and label the region R. [2]

200

Centre Number | Candidate Number

Candidate Name _____

International General Certificate of Secondary Education
UNIVERSITY OF CAMBRIDGE LOCAL EXAMINATIONS SYNDICATE

MATHEMATICS 0580/2, 0581/2
PAPER 2

Wednesday 13 NOVEMBER 1996 Afternoon 1 hour 30 minutes

Candidates answer on the question paper.
Additional materials:
Electronic calculator
Geometrical instruments
Mathematical tables (optional)

TIME 1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES

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FOR EXAMINER'S USE

This question paper consists of 12 printed pages.

MFK (0139) QK67837

[Turn over

1 A banana of mass 84 grams gives 60 calories of energy.
How many calories will a banana of mass 98 grams give?

Answer ..... [2]

2 Solve the inequality

$$3 - 4x < 11.$$

Answer ..... [2]

3 Taking 1 litre to be $1\frac{3}{4}$ pints, find

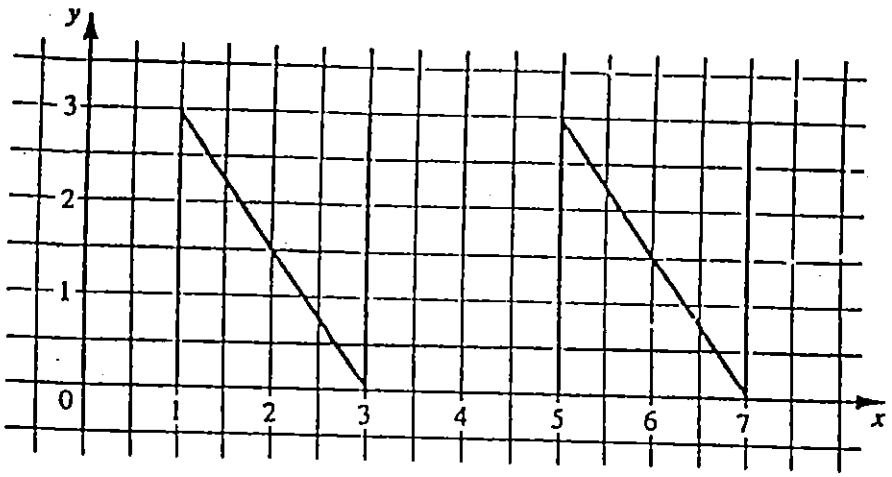
(a) the number of pints in 12 litres,

Answer (a) ..... pints [1]

(b) the number of litres in 8 pints, giving your answer as a decimal.

Answer (b) ..... litres [1]

4



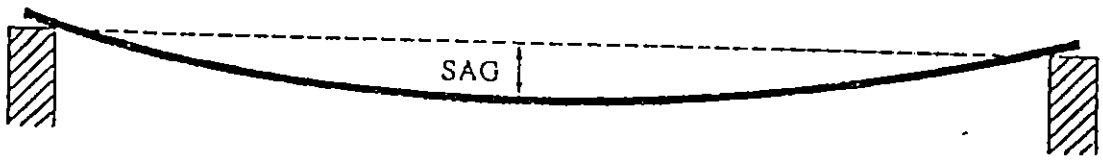
Describe fully a single transformation which will map the N on the left onto the N on the right.

Answer .....

.....

[2]

5



An engineer tests iron rods.
He measures the sag for different lengths of rod.
The results are as follows.

Length of rod (x metres)	0	1	2	3	4
Sag (y millimetres)	0	0.5	4	13.5	32

He knows that $y \propto x^n$, where n is a positive integer.
Find the value of n.

Answer n = ... [2]

6 Integers which are next to each other, like 8 and 9, or 71 and 72, are called consecutive integers.
Using your calculator, find two consecutive integers whose product is 756.

Answer ..... and ..... [2]

7 The bill for a meal in a restaurant is $48.30.

(a) The bill includes a tax of 15% of the cost of the meal.
What is the cost of the meal?

Answer (a) $ ..... [2]

(b) A tip of 8% of the bill is given.
How much is the tip, rounded off to the nearest dollar?

Answer (b) $ ..... [1]

8 A videotape is 207 metres long. Its total playing time is three hours.
Find the speed of the tape

(a) in metres per minute,

Answer (a) ..... m/min [1]

(b) in centimetres per second.

Answer (b) ..... cm/s [2]

9 (a) Work out $27^{\frac{1}{3}}$.

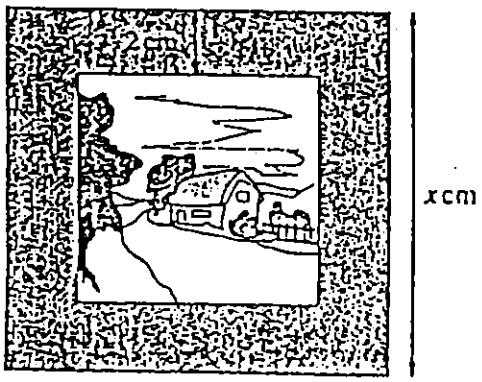
Answer (a) ..... [1]

(b) Solve the equation

$$x^{-3} = 8.$$

Answer (b) $x =$ ..... [2]

10



NOT TO SCALE

The diagram shows a square picture in a square frame of side x cm.
The width of the border all round the picture is 2 cm, and the area of the border is 112 cm^2.

(a) Use this information to form an equation in x.

Answer (a) ..... [1]

(b) Solve your equation to find the value of x.

Answer (b) $x =$ ..... [2]

205

11 To make an omelette, 50 grams of butter and 4 to 6 eggs are needed.
The mass of each egg is 70 grams, to the nearest 10 grams, but the mass of the butter is exact.

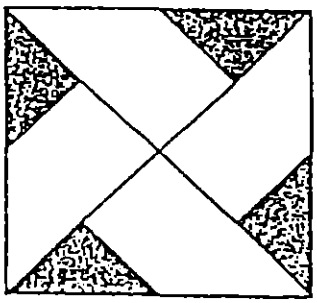
(a) What is the least possible mass of each egg?

Answer (a) ..... grams [1]

(b) Between what limits does the mass, M grams, of the omelette lie?

Answer (b) ..... $\leqslant M <$ ..... [2]

12 The diagram, which is drawn to scale, shows a square tile.



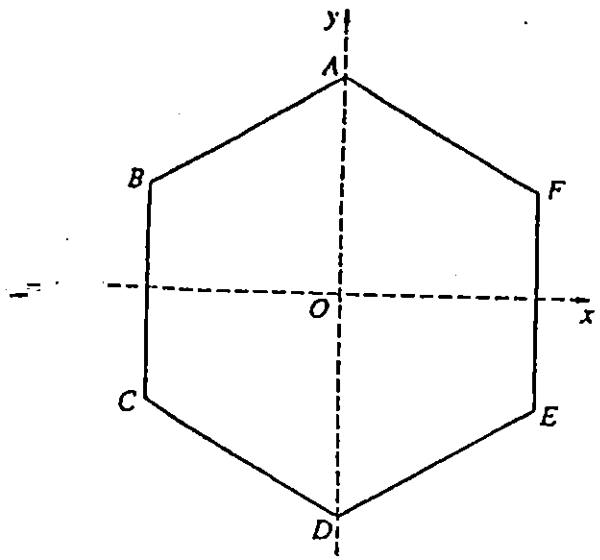
(a) Describe fully the symmetry of the tile.

Answer (a) ..... [2]

(b) What fraction of the tile is unshaded?

Answer (b) ..... [2]

13



$ABCDEF$ is a regular hexagon, and O is its centre.
The vector $\overrightarrow{OF} = \begin{pmatrix} \sqrt{3} \\ 1 \end{pmatrix}$.

(a) Calculate $|\overrightarrow{OF}|$, the length of OF.

Answer (a) $|\overrightarrow{OF}| =$ ..... [2]

(b) Write down the vector

(i) AF.

Answer (b) (i) $\overrightarrow{AF} = \begin{pmatrix} & \\ & \end{pmatrix}$ [1]

(ii) $\overrightarrow{BC}$.

Answer (b) (ii) $\overrightarrow{BC} = \begin{pmatrix} & \\ & \end{pmatrix}$ [1]

14

$$E = mc^2$$

(a) If $m = 20$ and $c = 3 \times 10^8$ find the value of E.
Give your answer in standard form.

Answer (a) $E =$ ..... [2]

(b) Give c in terms of E and m.

Answer (b) $c =$ ..... [2]

---

15 Two different quadrilaterals each have one, and only one, line of symmetry.
In quadrilateral *A*, the line of symmetry is a diagonal.
In quadrilateral *B*, the line of symmetry is not a diagonal.
Draw each of the quadrilaterals, showing the line of symmetry, and write down their special names.

Answer

QUADRILATERAL *A*

Name .....

QUADRILATERAL *B*

Name ..... [4]

16 $f(x) = 3x^2 - 3x + 1.$

(a) Find the exact value of $f\left(\frac{1}{6}\right)$

Answer (a) $f\left(\frac{1}{6}\right) =$ ..... [2]

(b) $f(1-x) = 3(1-x)^2 - 3(1-x) + 1.$

Show that $f(1-x) = f(x)$.

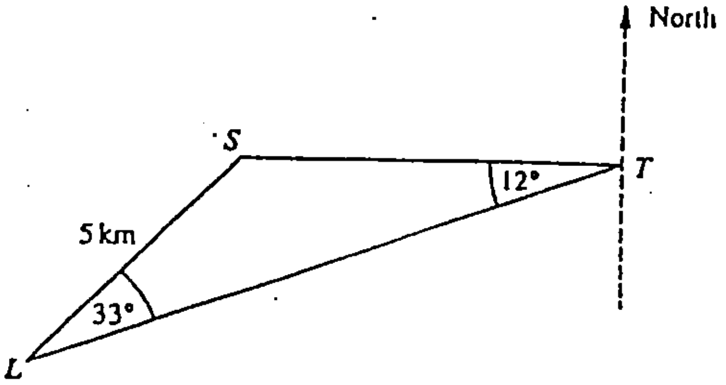
Answer (b)

[2]

(c) Write down the value of $f\left(\frac{5}{6}\right)$.

Answer (c) $f\left(\frac{5}{6}\right) =$ ..... [1]

17



A ship is at a point S, 5 kilometres from a lighthouse L.
It sails due East.
After 30 minutes it is at the point T.
Angle $SLT = 33°$ and angle $STL = 12°$.

(a) Calculate (i) the distance ST,

Answer (a) (i) $ST =$ .... km [3]

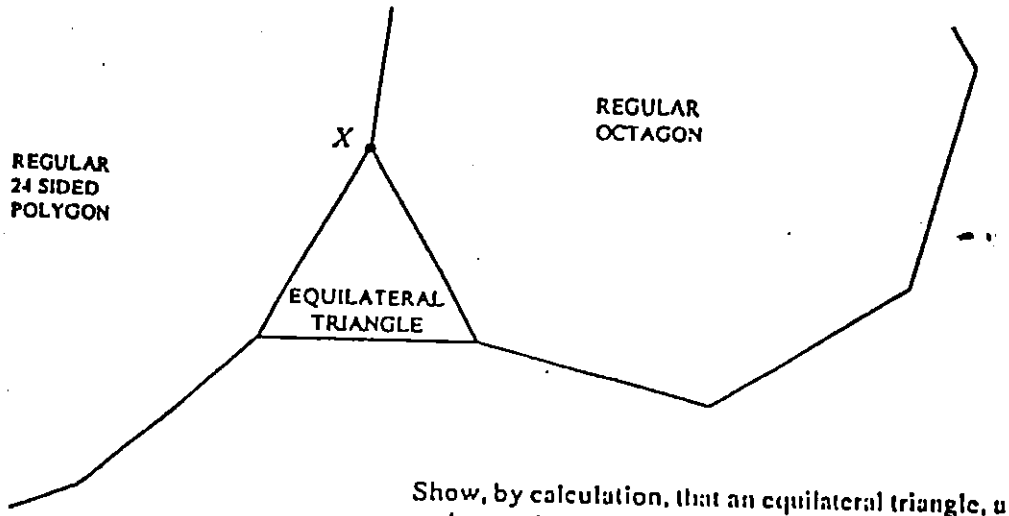
(ii) the speed of the ship, in kilometres per hour.

Answer (a) (ii) .... km/h [1]

(b) Find the bearing of L from T.

Answer (b) .... [1]

18

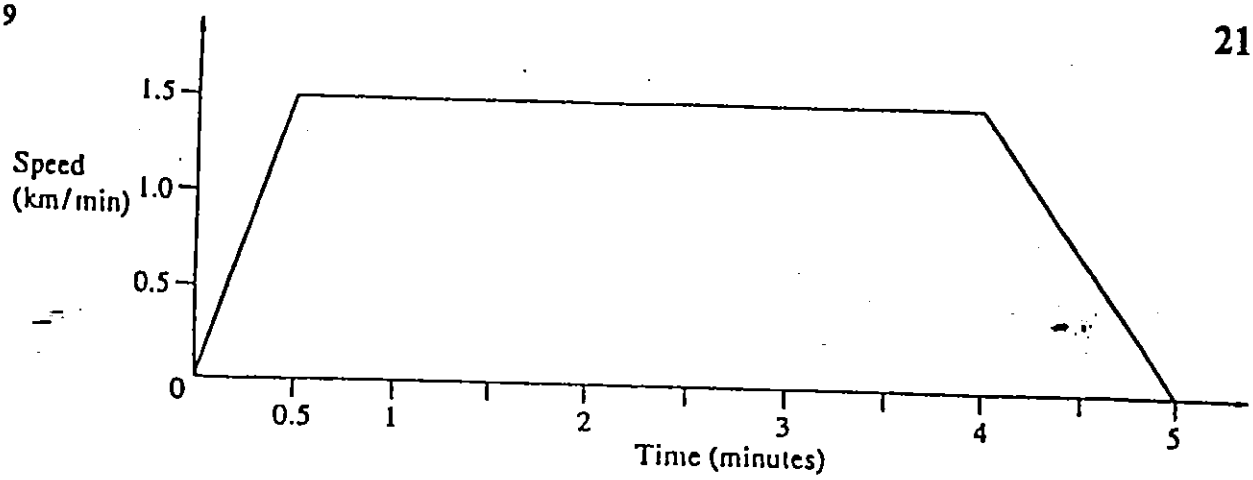


Show, by calculation, that an equilateral triangle, a regular octagon and a regular 24 sided polygon fit together exactly at the point X, as shown in the diagram.

Answer

[5]

19



The graph shows the speed of a car during a five minute journey.

(a) For how long does the car travel at a steady speed?

Answer (a) ..... min [1]

(b) What is the acceleration of the car during the first half minute?

Answer (b) ..... km/min^2 [1]

(c) Calculate the distance travelled by the car during

(i) the first half minute of the journey,

Answer (c) (i) ..... km [1]

(ii) the whole journey.

Answer (c) (ii) ..... km [2]

Question 20 is printed overleaf.

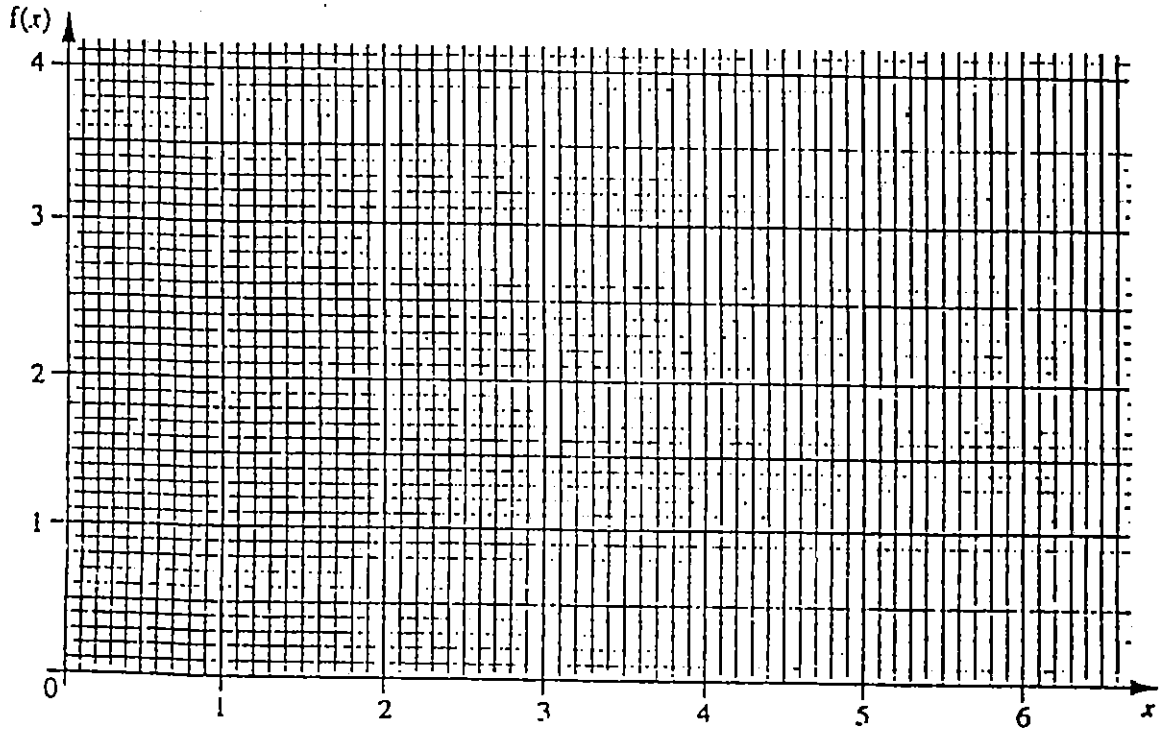
20 (a) Complete the table of values below for the function

$$f(x) = \frac{6}{x} + x - 3.$$

x	1	1.2	1.5	2	3	4	5	6
$f(x)$	4	3.2	2.5	2	2			

[2]

(b) Draw the graph of $f(x) = \frac{6}{x} + x - 3$ on the grid below, for $1 \leq x \leq 6$.



[2]

(c) Draw a tangent to the curve at the point (1.5, 2.5).
Estimate the gradient of the curve at that point.

Answer (c) ..... [3]

212

Centre Number

Candidate Name

International General Certificate of Secondary Education
UNIVERSITY OF CAMBRIDGE LOCAL EXAMINATIONS SYNDICATE

MATHEMATICS 0580/2, 0581/2
PAPER 2

Tuesday 3 JUNE 1997 Morning 1 hour 30 minutes

Candidates answer on the question paper.
Additional materials:
Electronic calculator
Geometrical instruments
Mathematical tables (optional)

TIME 1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces at the top of this page.
Answer all questions.
Write your answers in the spaces provided on the question paper.
If working is needed for any question it must be shown below that question.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 70.
Electronic calculators should be used.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.

FOR EXAMINER'S USE

This question paper consists of 12 printed pages.

MFK (0235) QF71555

1 A chemical is stored at −34.8 °C. It is heated so that its temperature rises by 81.9 °C. What is its new temperature? **213**

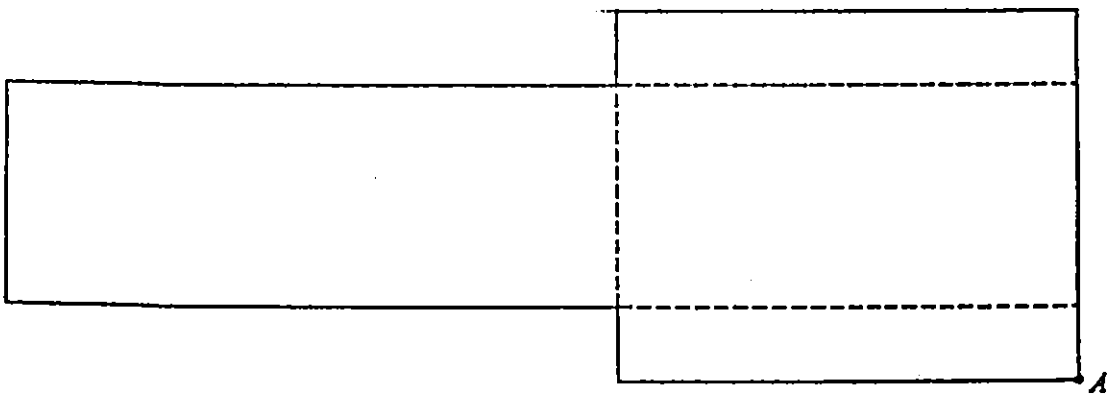
Answer ..... °C [1]

---

2 Work out $\dfrac{17-3\sqrt{3}}{\sqrt{2}}$, giving your answer correct to 3 decimal places.

Answer ..... [2]

3



(a) Draw two more broken lines on the diagram above to make it into the net of a cuboid. [1]

(b) Mark clearly on the diagram the point A' which will touch the point A when the net is folded to make the cuboid. [1]

---

4 Carla estimates the length of a wall to be 25 metres and the height to be 2 metres.
Paolo tells her that the length is 25 metres correct to the nearest 5 metres and the height is 2 metres correct to the nearest 10 centimetres. Complete the statements below.

(a) ..... m ≤ length of the wall < ..... m. [1]

(b) ..... m ≤ height of the wall < ..... m. [1]

---

5 $\frac{82}{99}$, 82%, $\sqrt{0.674}$.

(a) Write these in order of size, starting with the smallest.

Answer (a) ..... < ..... < ..... [1]

(b) Find the difference between the largest and the smallest, giving your answer correct to two significant figures.

Answer (b) ..... [1]

---

6 Solve the equations $3x + 4y = 3$,

$x + 6y = 8$.

Answer $x =$ .....

$y =$ ..... [3]

---

7 In July 1994 the comet Shoemaker-Levy 9 struck the planet Jupiter at a speed of 135 000 miles per hour.

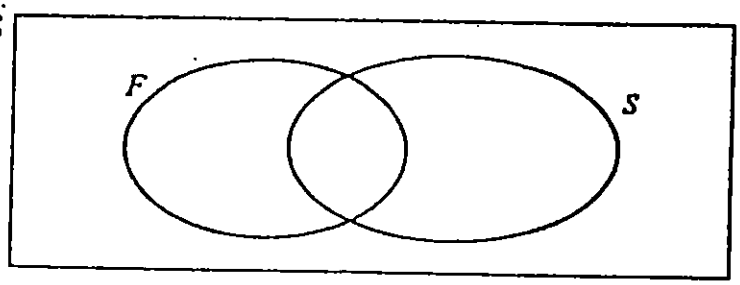
(a) Given that 1 mile is 1580 metres, change 135 000 miles per hour into metres per second.

Answer (a) ..... m/s [2]

(b) Give your answer to part (a) in standard form.

Answer (b) ..... m/s [1]

8



(a) Shade the set $F \cap S'$ in the Venn diagram. [1]

(b) In a class of 30 students, 10 study French, 18 study Spanish and 5 study neither. How many students study

(i) French or Spanish or both,

Answer (b) (i) ..... [1]

(ii) French but not Spanish?

Answer (b) (ii) ..... [1]

---

9 For his holiday, Pierre changed 10 000 francs into dollars when the rate was \$1 = 5.05 francs. At the end of the holiday he had \$190 left.

(a) How many dollars, to the nearest dollar, did he spend?

Answer (a) \$ ..... [2]

(b) He changed the \$190 for 1000 francs. What was this exchange rate, in francs per dollar, correct to 2 decimal places?

Answer (b) \$1 = ... francs [1]

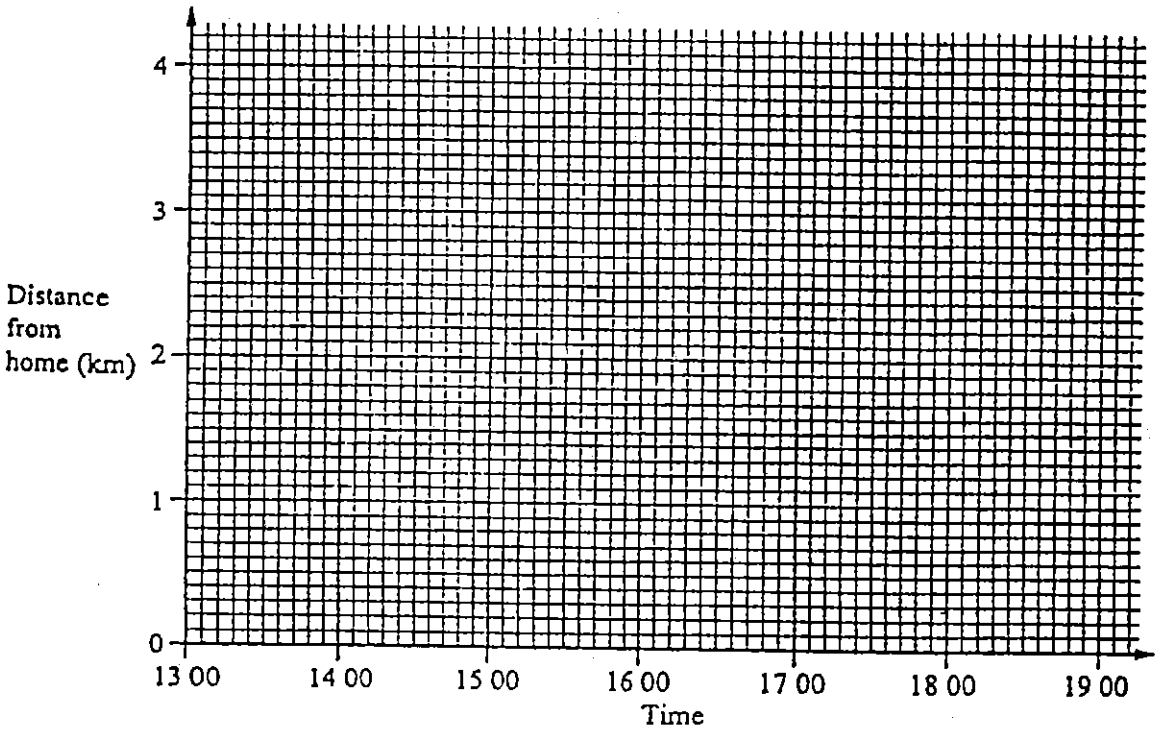
---

10 $T = 3 + \frac{5}{V}$. **216**

Make V the subject of this formula.

Answer $V =$ ..... [3]

11



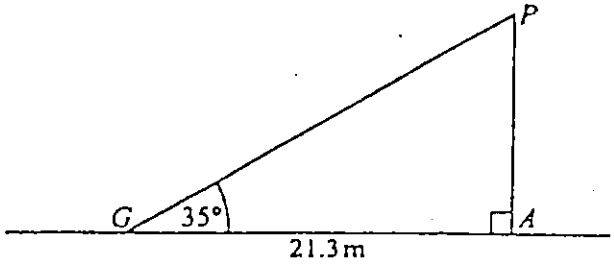
Hans left home at 13 30 and walked at a constant speed to the football ground 4 km away. He arrived at 14 18. After the match he left the ground at 17 00 and travelled back home in a friend's car at an average speed of 20 km/h.

(a) Use this information to draw a travel graph on the grid above. [2]

(b) Calculate Hans' walking speed in kilometres per hour.

Answer (b) ..... km/h [1]

12

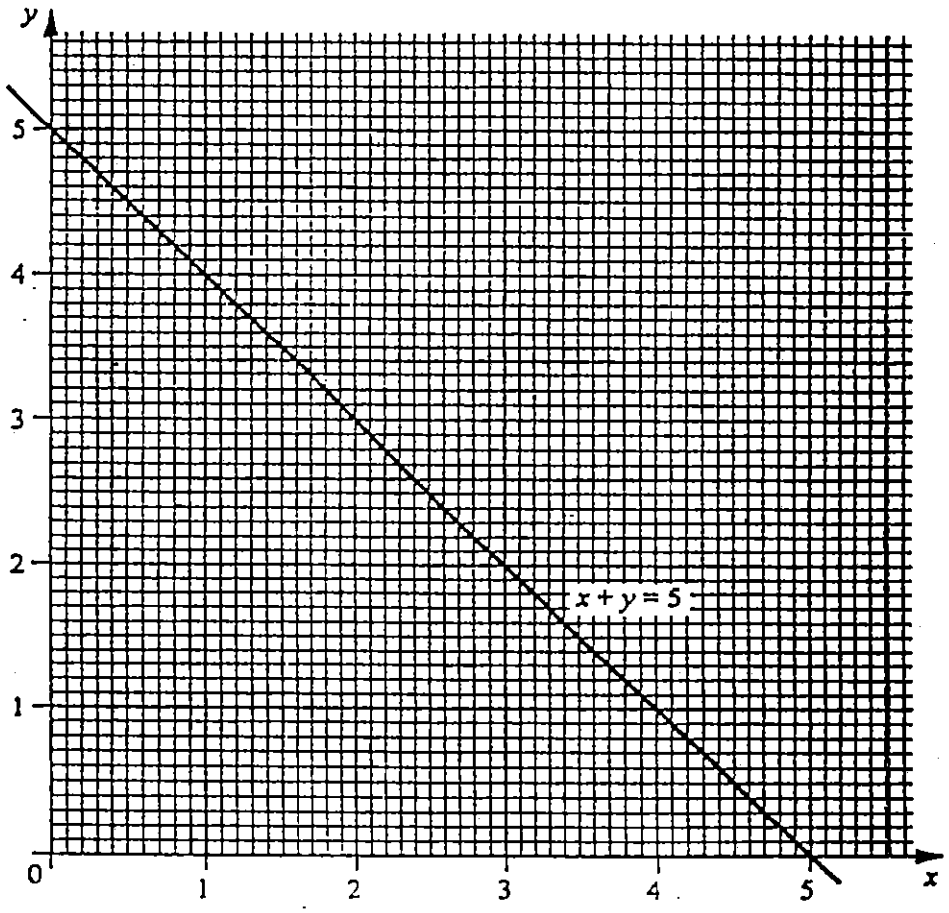


NOT TO SCALE

A wire, GP, connects the top of a vertical pole, AP, to the horizontal ground.
$GA = 21.3$ m and angle $PGA = 35°$.
Calculate GP, the length of the wire.

Answer $GP =$ ..... m [3]

13



R is the region where

$y \geqslant 2$,
$y \leqslant 2x$
and $x + y \geqslant 5$.

Draw two more lines on the grid above and write R in the correct region. [3]

14 Leo plans to paint a picture. He considers making it 48 cm long and 36 cm wide.
He then decides to increase the length of 48 cm in the ratio 5 : 4 and to decrease the width of 36 cm in the ratio 3 : 4.

(a) Find the new length and width of the picture.

Answer (a) length = ... cm [1]

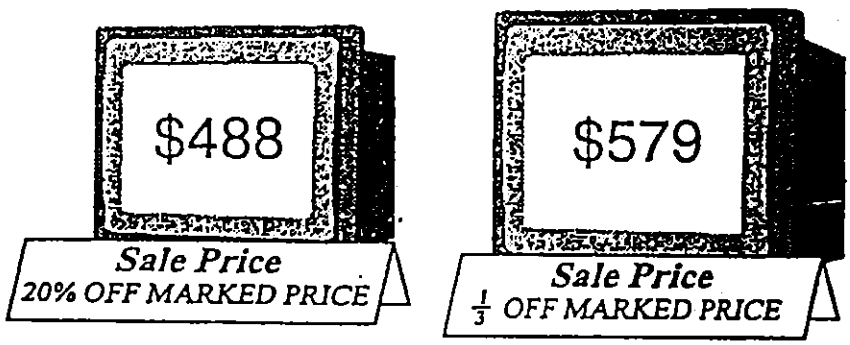
width = ... cm [1]

(b) Find the fraction $\frac{\text{new area}}{\text{old area}}$ in its lowest terms.

Answer (b) ..... [1]

---

15 A shop sells television sets for $488 and $579.
In a sale they are offered at reduced prices.



(a) Calculate the sale prices.

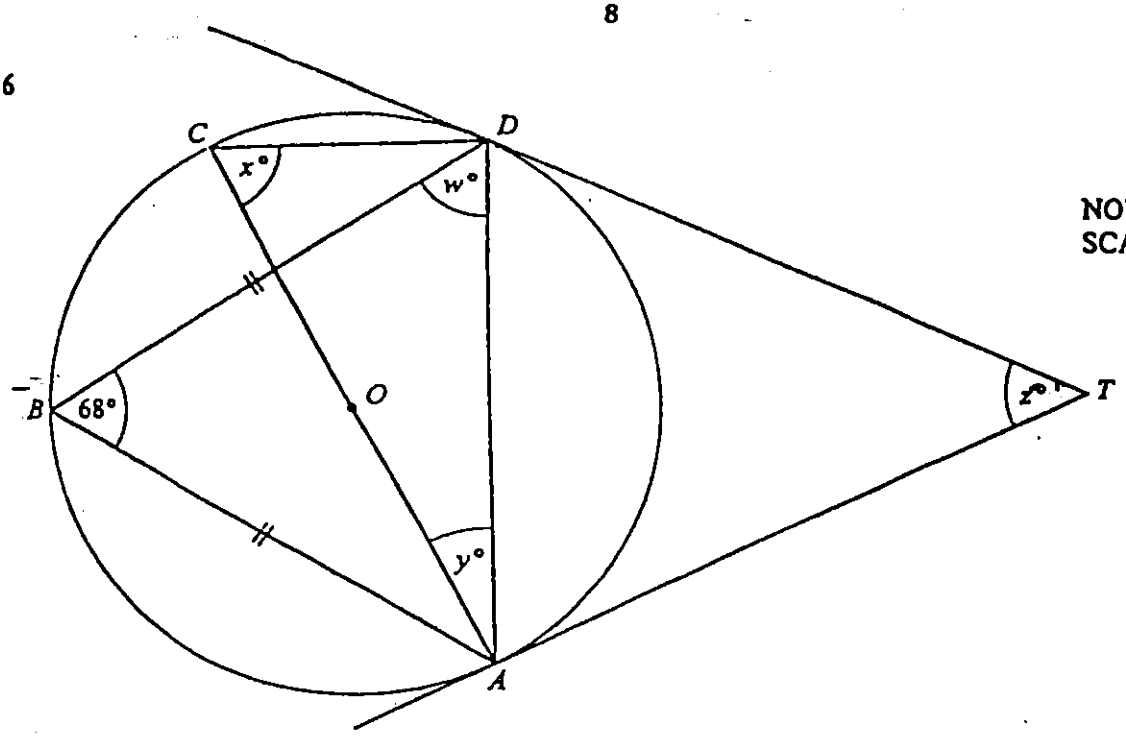
Answer (a) $ ..... [1]

$ ..... [1]

(b) The original selling price of $488 gave a profit of 52.5% on the cost price.
Calculate the cost price of this television set.

Answer (b) $ ..... [2]

16



NOT TO SCALE

AOC is the diameter of circle $ABCD$.
AT and DT are tangents. $BD = BA$ and angle $DBA = 68°$.
Find the angles marked w, x, y and z.

Answer $w =$ ..... [1]

$x =$ ..... [1]

$y =$ ..... [1]

$z =$ ..... [1]

---

17 $f(x) = 5x + 1$ and $g(x) = 9 - 2x$ for all values of x.

(a) Find (i) g(2),

Answer (a) (i) g(2) = ... [1]

(ii) fg(2).

Answer (a) (ii) fg(2) = ... [1]

(b) Find gf(x) in its simplest form.

Answer (b) gf(x) = ... [2]

220

18 A decagon has 10 sides.

(a) Calculate the size of each interior angle of a regular decagon.

Answer (a) ..... [2]

(b) An irregular decagon has 7 interior angles of 156° each and the other 3 interior angles are in the ratio 3 : 4 : 5. Calculate the size of the smallest angle in the decagon.

Answer (b) ..... [2]

---

19 A is the point (3, 2) and B is the point (−4, 26).

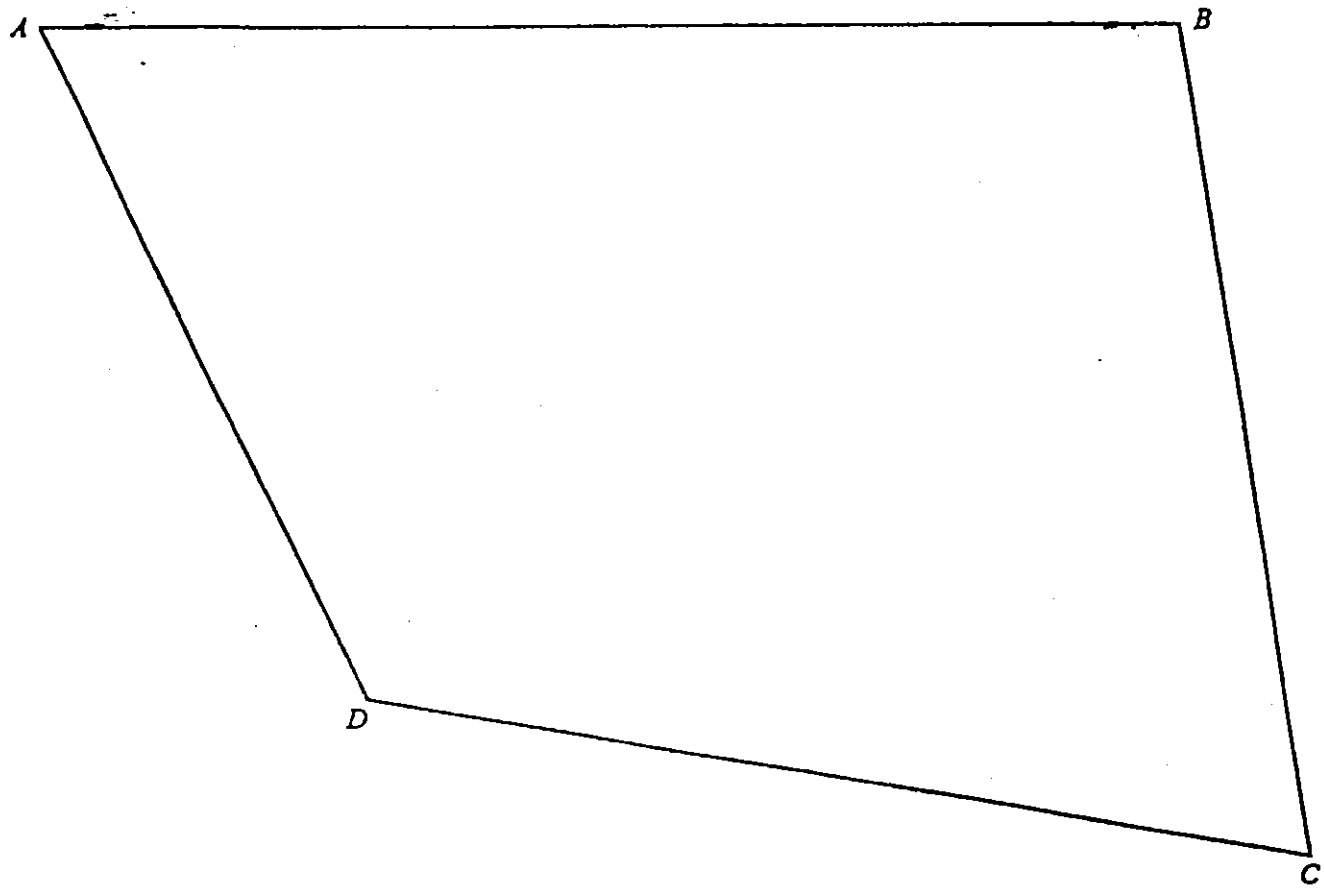
(a) Calculate the length of AB.

Answer (a) $AB =$ ..... [2]

(b) The vector $\overrightarrow{BC} = \begin{pmatrix} 1 \\ -20 \end{pmatrix}$. Write $\overrightarrow{AC}$ as a column vector.

Answer (b) $\overrightarrow{AC} = \begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [2]

20



Scale: 1 centimetre represents 2 metres

The diagram is a scale drawing of Sonia's garden.
She wishes to plant a tree so that it is the same distance from the walls *BC* and *CD*, and also the same distance from the corners *A* and *C*.

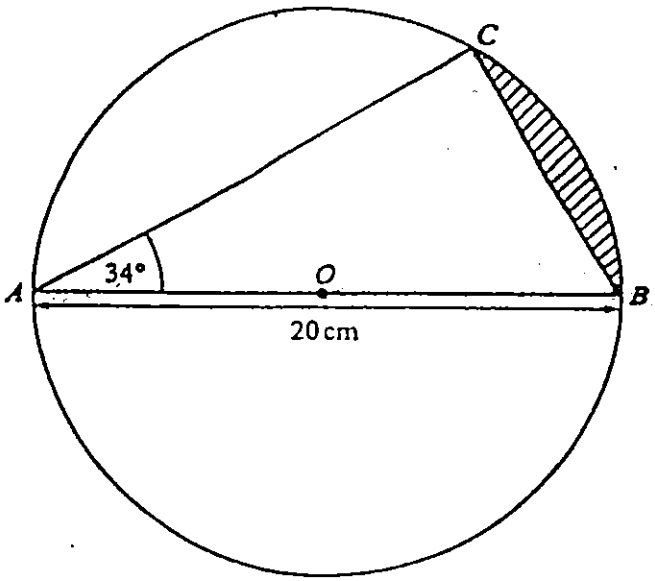
(a) Using ruler and compasses only, and leaving in all construction arcs,
draw (i) the locus of points which are the same distance from *BC* and *CD*,
(ii) the locus of points which are the same distance from *A* and *C*.

[3]

(b) Mark the position of the tree. Label it *T*.
What is the distance, in metres, of the tree from *A*?

Answer (b) ..... m [1]

21



NOT TO SCALE

A circular plate, centre O, has diameter $AOB = 20$ cm.
C is a point on the circumference such that angle $CAB = 34°$.
A crack appears along the chord CB and the shaded segment drops off.
Calculate

(a) the length of the chord CB,

Answer (a) $CB =$ ..... cm [2]

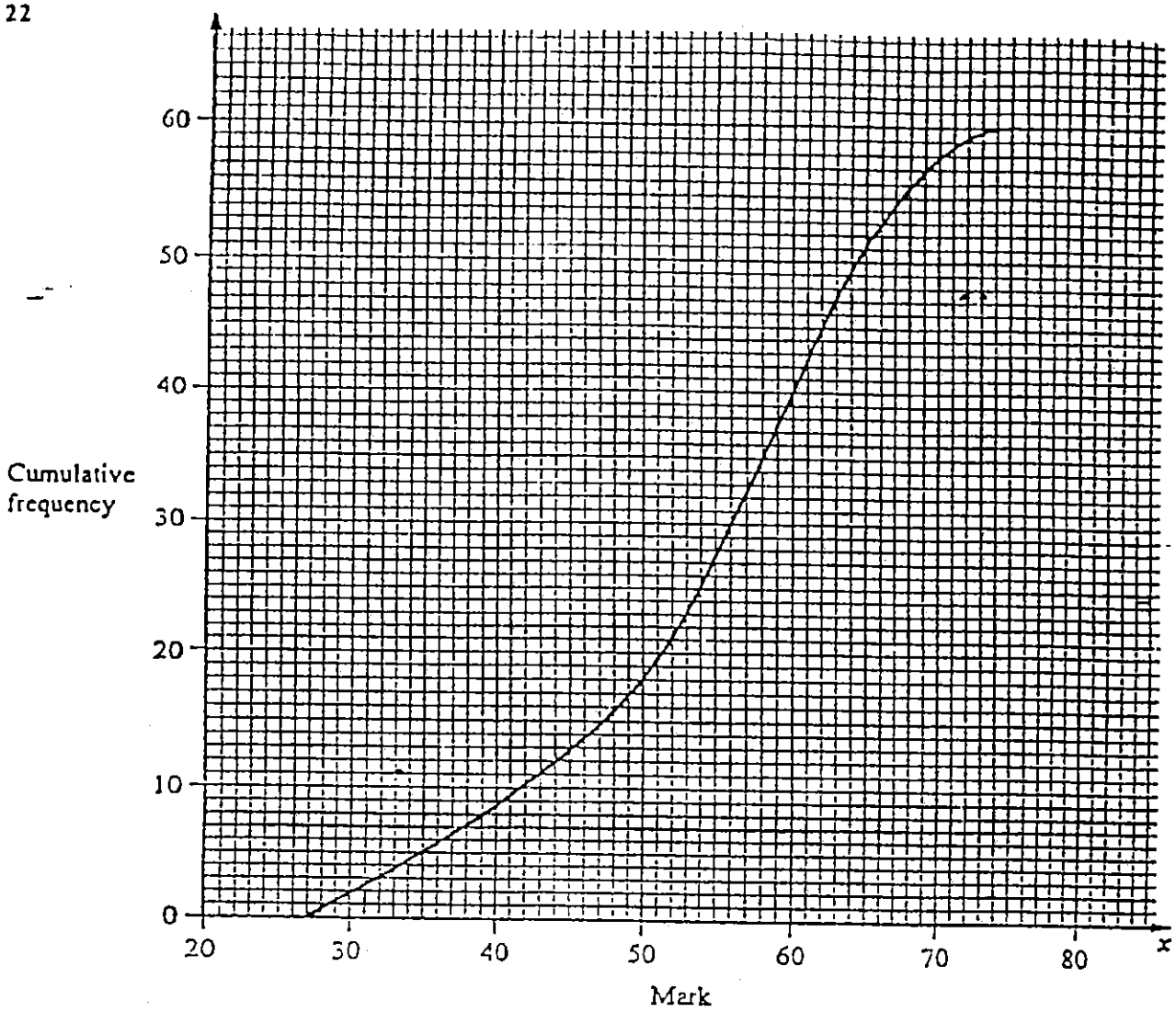
(b) the acute angle COB,

Answer (b) Angle $COB =$ ..... [1]

(c) the length of the minor arc CB. [π is approximately 3.142.]

Answer (c) Arc $CB =$ ..... cm [2]

22



Ferdinand collects the examination marks for 60 students. He uses them to draw the cumulative frequency diagram above, which shows the number of students who score x marks or less.

(a) Use the graph to complete the following statements for these 60 students.

(i) The median mark is ..... . [1]

(ii) The upper quartile is ..... . [1]

(iii) The interquartile range is ..... . [1]

(b) Jean tells Ferdinand he has not considered the 20 students in the top class, who all scored more than 75 marks.
Use the marks for all 80 students to complete the following statements.

(i) The new median mark is ..... [1]

(ii) The percentage of candidates who fail when the pass mark is 50 is ..... %. [1]

Centre Number | Candidate Number

Candidate Name ____________________

International General Certificate of Secondary Education
UNIVERSITY OF CAMBRIDGE LOCAL EXAMINATIONS SYNDICATE

MATHEMATICS 0580/2, 0581/2
PAPER 2

Wednesday 12 NOVEMBER 1997 Afternoon 1 hour 30 minutes

Candidates answer on the question paper.
Additional materials:
Electronic calculator
Geometrical instruments
Mathematical tables (optional)
Tracing paper (optional)

TIME 1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces at the top of this page.

Answer all questions.

Write your answers in the spaces provided on the question paper.

If working is needed for any question it must be shown below that question.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [ ] at the end of each question or part question.

The total of the marks for this paper is 70.

Electronic calculators should be used.

If the degree of accuracy is not specified in the question, and if the answer is not exact, the answer should be given to three significant figures. Answers in degrees should be given to one decimal place.

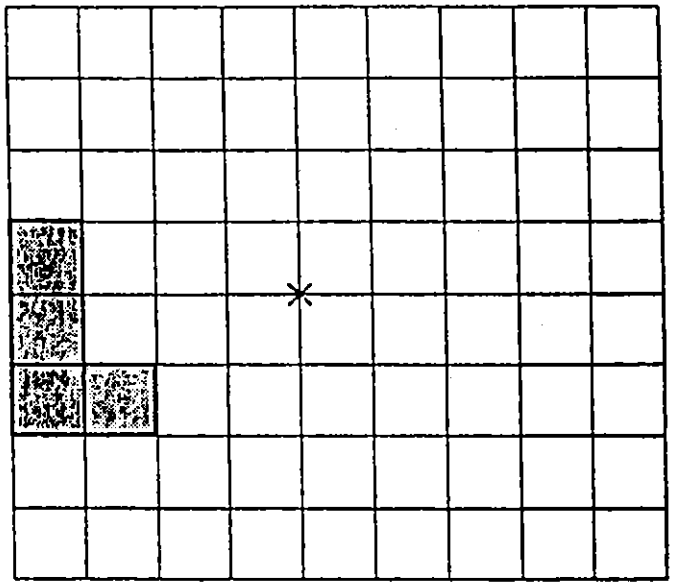
FOR EXAMINER'S USE

This question paper consists of 11 printed pages and 1 blank page.

1 $\mathfrak{E} = \{x : 1 < x < 20\}$, $A = \{\text{prime numbers}\}$ and $B = \{\text{odd numbers}\}$.
List the set $A \cap B$.

Answer $A \cap B = \{$.....$\}$ [2]

2 Draw the image of the L shape after a rotation of 180° about the point X.



[2]

3 The table shows the temperatures recorded at a weather station.

	TUESDAY			WEDNESDAY			
Time	12 00	16 00	20 00	00 00	04 00	08 00	12 00
Temperature in °C	15	11	4	−1	−4	0	10

(a) What was the difference between the temperature at 12 00 on Tuesday and the temperature at midnight?

Answer (*a*) .....°C [1]

(b) Briefly describe how the temperature changed during the 24 hour period recorded in the table.

Answer (*b*) .....

..... [1]

4 If $x > 4$, arrange the following three expressions in order, starting with the smallest.

$$\frac{4}{x}, \quad \frac{x}{4}, \quad 4 - x.$$

Answer ..... < ..... < ..... [2]

5 Conchita measured the diameter of a tennis ball as 6 centimetres, but this is only correct to the nearest centimetre.
Between what limits does the radius (r cm) of the ball lie?

Answer ..... $\leqslant r <$ ..... [2]

6 Show, by drawing and shading, the set of all points which are at least 2 centimetres from the point O but no more than 3 centimetres from it.

O

7 Fumika changed 2000 yen into dollars at a rate of $1 = 81.50 yen.
Calculate how much she received, giving your answer correct to two decimal places.

Answer $ ..... [2]

8 The density of the air we breathe is 0.0013 grams per cubic centimetre.

(a) Write this number in standard form.

Answer (*a*) ..... [1]

(b) Find the density of air in grams per cubic metre.

Answer (*b*) ..... g/m^3 [1]

9 Simplify (a) $2x^2 \times 3x^3$.

Answer (*a*) ..... [1]

(b) $a^{\frac{5}{6}} \div a^{\frac{1}{3}}$.

Answer (*b*) ..... [1]

10 $f(x) = (x + 1)^3$.

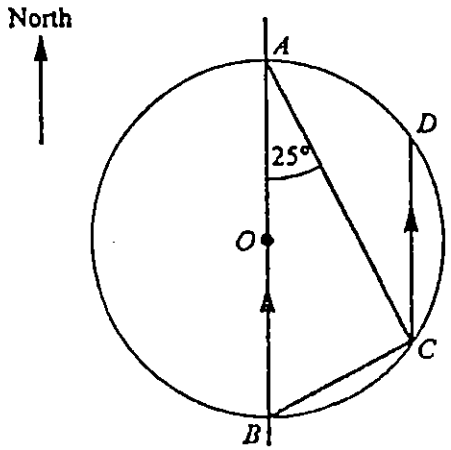
Find (a) $f(-3)$,

Answer (a) $f(-3) =$ ..... [1]

(b) $f^{-1}(x)$.

Answer (b) $f^{-1}(x) =$ ..... [2]

11



NOT TO SCALE

BA is a diameter of the circle $ABCD$.
Angle $BAC = 25°$ and CD is parallel to BA.

(a) Calculate angle ACD.

Answer (a) Angle $ACD =$ ..... [1]

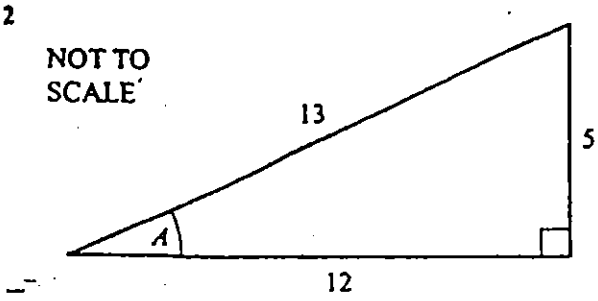
(b) Calculate angle ABC.

Answer (b) Angle $ABC =$ ..... [1]

(c) If A is due North of B, find the bearing of B from D.

Answer (c) ..... [1]

12



(a) Write down the value of $\tan A$ as a fraction.

Answer (a) ..... [1]

(b) Find the value of

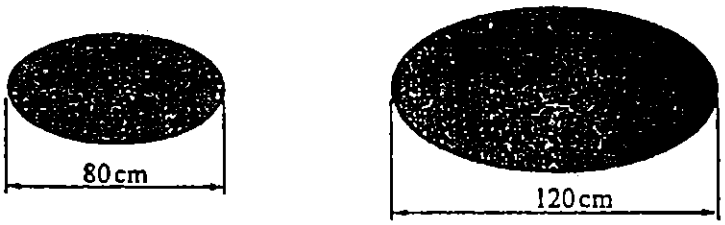
$$\frac{2 \tan A}{(1 - \tan A)(1 + \tan A)}.$$

Give your answer as a fraction in its lowest terms.

Answer (b) ..... [2]

---

13 Two table tops are similar in shape, as shown in the diagram.



The area of the smaller one is $\frac{1}{4}$ m^2.
Calculate the area of the larger one.

Answer ..... m^2 [3]

---

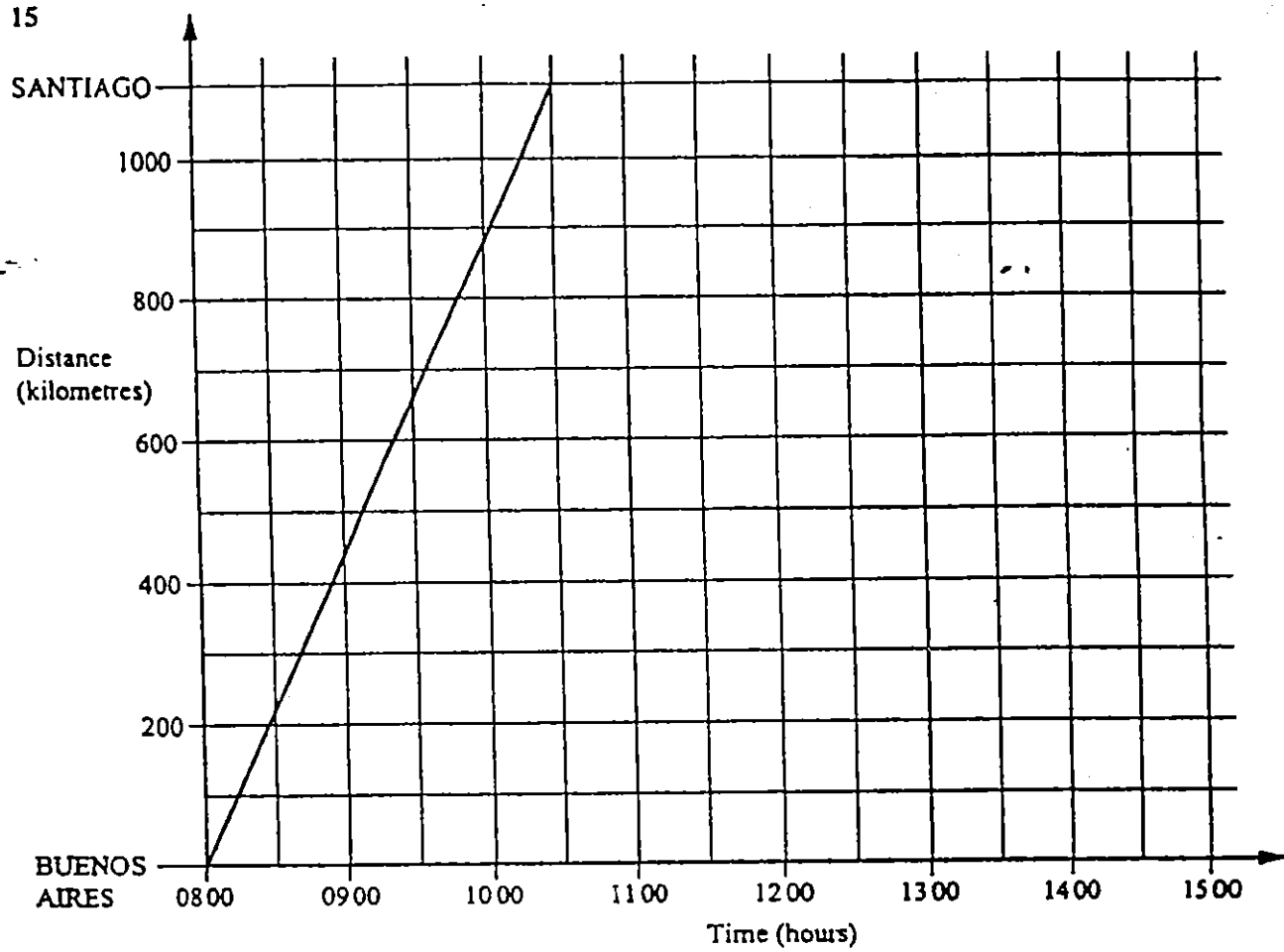
14 (a) Factorise $x^2 - 7x + 10$.

Answer (a) ..... [1]

(b) Factorise completely $3ax - 6x - ay + 2y$.

Answer (b) ..... [2]

15



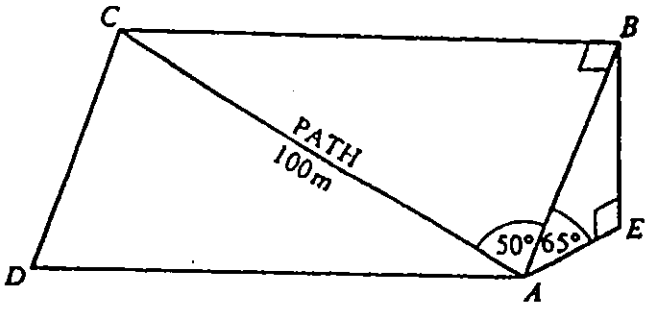
An aircraft flew the 1100 kilometres from Buenos Aires to Santiago.
The flight is shown on the graph above.

(a) Calculate the average speed of the aircraft.

Answer (a) ..... km/h [1]

(b) The aircraft waited at Santiago for $1\frac{1}{2}$ hours before flying back to Buenos Aires at an average speed of 550 kilometres per hour.
Show this information on the graph. [2]

16



NOT TO SCALE

On a hillside $ABCD$ a path, AC, is 100 metres long.
The path makes an angle of 50° with AB. Angle $ABC = 90°$.

(a) Calculate the length of AB.

Answer (a) AB = ... m [2]

(b) The hillside slopes upwards at an angle of 65° and angle $AEB = 90°$.
Calculate the height, BE, of the hill.

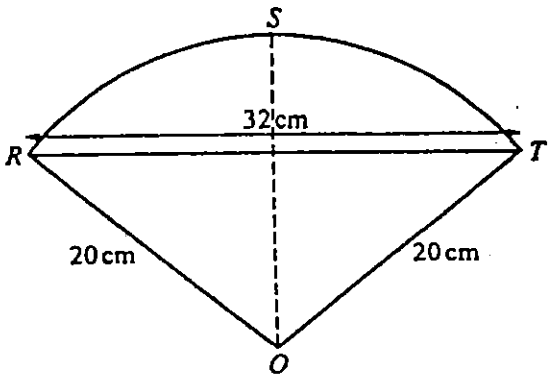
Answer (b) BE = ... m [2]

---

17 Simplify $\frac{x}{x+2} - \frac{x-2}{x}$, showing all your working.

Answer ..... [4]

18



NOT TO SCALE

The diagram shows an arc, RST, of a circle centre O.
The radius of the circle is 20 centimetres and the distance from R to T is 32 centimetres.

(a) Show that angle $ROT = 106.26°$.

Answer (a)

[2]

(b) Calculate the length of the arc RST. [π is approximately 3.142.]

Answer (b) Arc RST = ... cm [2]

---

19 A bank uses the formula $A = P\left(1 + \frac{r}{100}\right)^n$ to calculate the amount of money in an account.

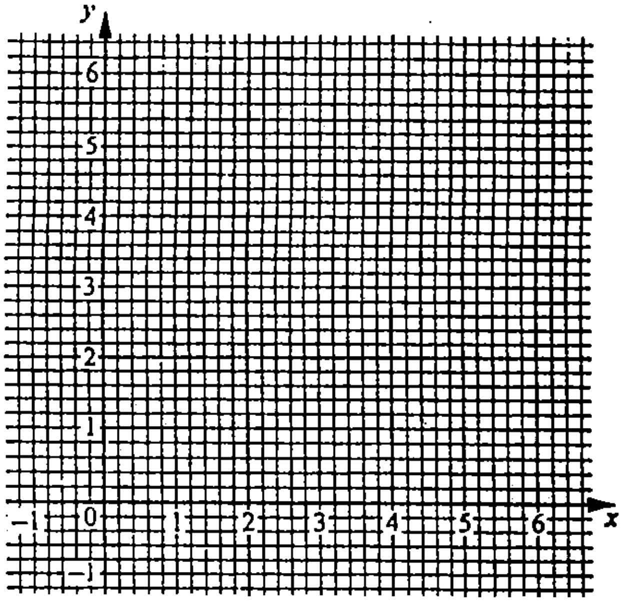
(a) Calculate A when $P = 800$, $r = 6$ and $n = 5$, correct to two decimal places.

Answer (a) ..... [2]

(b) When $n = 1$, the formula is $A = P\left(1 + \frac{r}{100}\right)$.
Make r the subject of this formula.

Answer (b) r = ... [3]

20



(a) On the grid above, draw the lines $x + y = 5$ and $2y = 3x$. [3]

(b) By shading the unwanted regions, indicate clearly the area where

$x \geqslant 0$, $x + y \leqslant 5$ and $2y \geqslant 3x$. [2]

21 Showing all your working, solve the following equations.

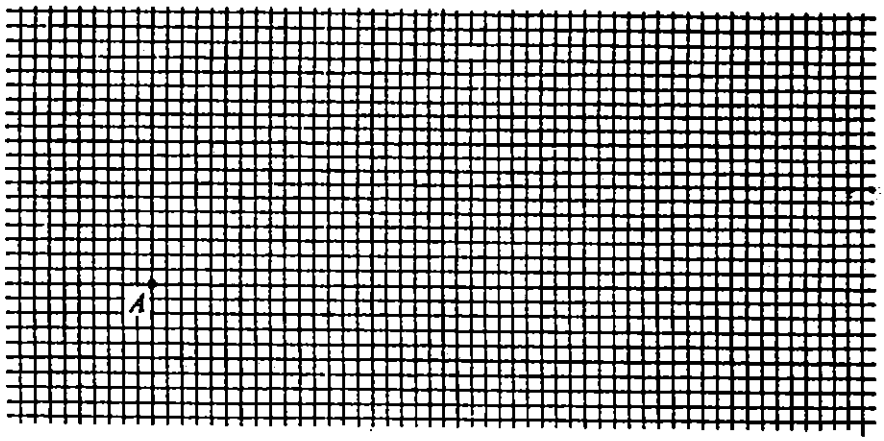
(a) $2x^2 - 3x = 0$.

Answer (*a*) $x =$ .... or .... [2]

(b) $2x^2 - 3x - 1 = 0$, giving your answers correct to two decimal places.

Answer (*b*) $x =$ .... or .... [4]

22



(a) Using a scale of 1 centimetre to represent 1 unit, draw the vectors

$\overrightarrow{AB} = \begin{pmatrix} 5 \\ 0 \end{pmatrix}$ and $\overrightarrow{BC} = \begin{pmatrix} 1 \\ 2 \end{pmatrix}$ on the grid. **[2]**

(b) Calculate $|\overrightarrow{BC}|$, the magnitude of vector $\overrightarrow{BC}$.

Answer (b) $|\overrightarrow{BC}| =$ ..... **[2]**

(c) Find vectors $\overrightarrow{AD}$ and $\overrightarrow{DC}$ such that the quadrilateral $ABCD$ is a kite.

Answer (c) $\overrightarrow{AD} = \begin{pmatrix} \quad \\ \quad \end{pmatrix}$ **[1]**

$\overrightarrow{DC} = \begin{pmatrix} \quad \\ \quad \end{pmatrix}$ **[1]**

Centre Number	Candidate Number

Candidate Name _____

International General Certificate of Secondary Education
UNIVERSITY OF CAMBRIDGE LOCAL EXAMINATIONS SYNDICATE

MATHEMATICS 0580/2, 0581/2

PAPER 2

Tuesday 2 JUNE 1998 Morning 1 hour 30 minutes

Candidates answer on the question paper.
Additional materials:
Electronic calculator
Geometrical Instruments
Mathematical tables (optional)

TIME 1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES

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Electronic calculators should be used.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142.

FOR EXAMINER'S USE

This question paper consists of 12 printed pages.

MFK (0460) OF85539

1 Work out $52 - 3(4.1 - 1.8)$.

Answer ..... [1]

2 A snail moves 3 centimetres in one minute.

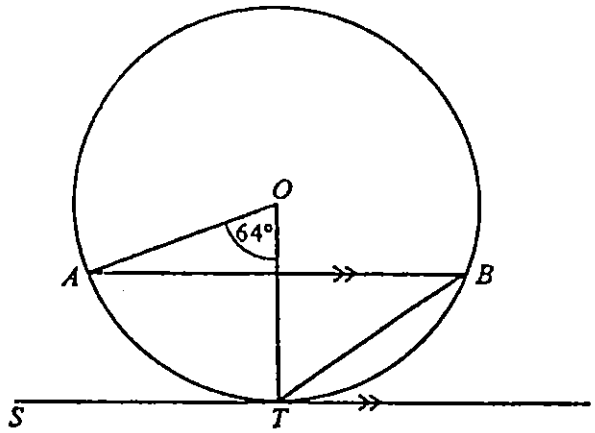
(a) Find the speed of the snail in kilometres per hour, giving your answer as a decimal.

Answer (a) ..... km/h [1]

(b) Write your answer to part (a) in standard form.

Answer (b) ..... km/h [1]

3



NOT TO SCALE

A tangent ST touches the circle, centre O, at the point T. The chord AB is parallel to the tangent such that angle $AOT = 64°$.

Find (a) angle ABT,

Answer (a) Angle ABT = ... [1]

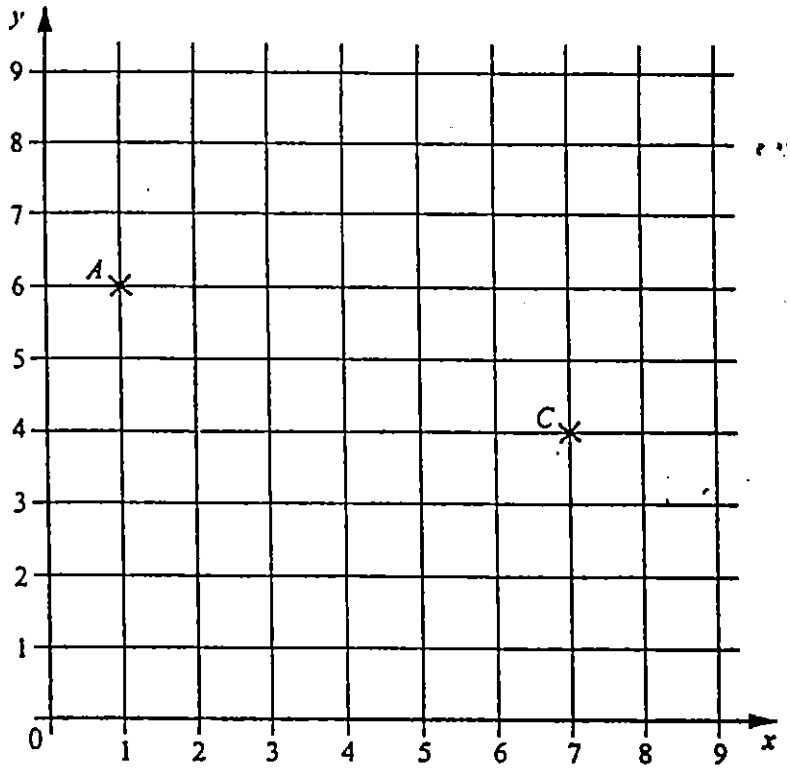
(b) angle OTB.

Answer (b) Angle OTB = ... [1]

4 Marie invests \$250 at R% simple interest per year.
In 5 years she receives \$50 interest altogether. Calculate the value of R.

Answer R = ... [2]

5



The points A (1, 6) and C (7, 4) are marked on the diagram.

(a) Draw the vector $\overrightarrow{AB}$ such that $\overrightarrow{AB} = \begin{pmatrix} 2 \\ 3 \end{pmatrix}$. [1]

(b) Write down the column vector $\overrightarrow{AD}$ such that $ABCD$ is a parallelogram.

Answer $\overrightarrow{AD} = \begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [1]

---

6 **Find two positive integers a and b such that** $\frac{a}{6} + \frac{b}{21} = \frac{17}{42}$.

Answer $a =$ .....

$b =$ ..... [2]

---

7 Four estimates for the time Pedro took to run 500 metres were

2 minutes 23 seconds, 2.3 minutes, $2\frac{1}{3}$ minutes and 2.23 minutes.

Write these times in order of size.

Answer ..... < ..... < ..... < ..... [2]

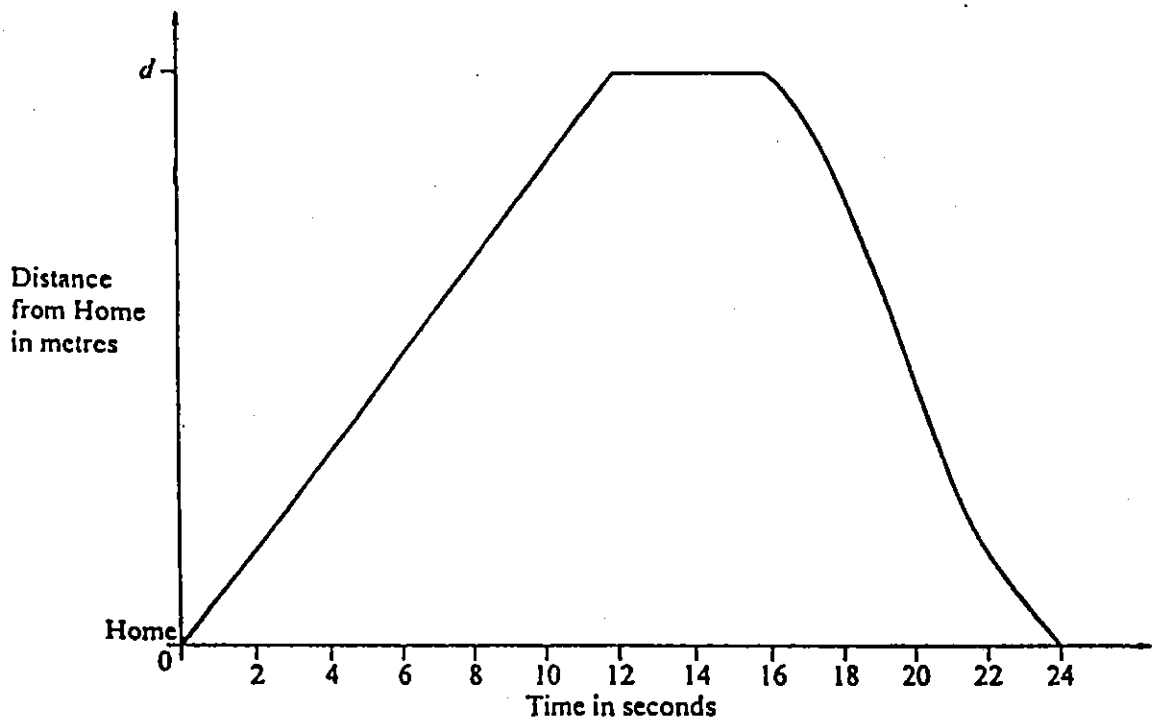
---

8 Solve the simultaneous equations $3x - y = 4$,
$x - y = 8$.

Answer $x =$ .....

$y =$ ..... [2]

9



David started to walk to school. He walked d metres and then he realised he had forgotten a book. He ran home to collect it. The diagram shows a distance-time graph representing this.

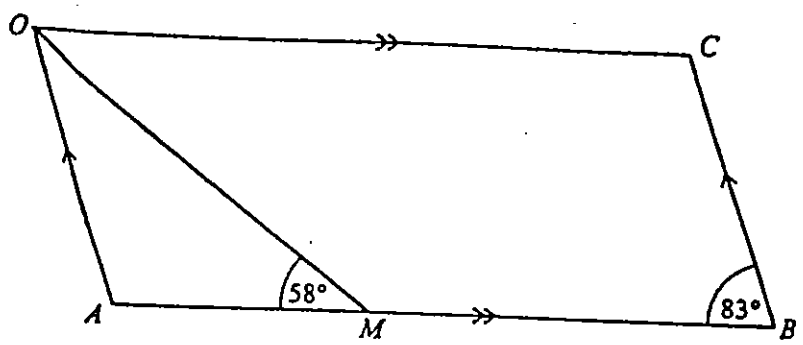
(a) Estimate the time, t seconds after the start, when his speed was greatest.

Answer (a) $t =$ ..... [1]

(b) His average speed over the whole 24 seconds was 1.5 m/s.
Calculate the value of d.

Answer (b) $d =$ ..... [1]

10



NOT TO SCALE

$OABC$ is a parallelogram and M is a point on AB.
Angle $AMO = 58°$ and angle $ABC = 83°$.

(a) Find angle AOM.

Answer (a) Angle AOM = ... [1]

(b) The area of the parallelogram is 96 cm^2 and $AM : MB = 1 : 2$.
Find the area of triangle OAM.

Answer (b) ..... cm^2 [1]

11 Find x when $\sin x° = -0.866$, $\cos x° = -0.5$ and $0 \leqslant x \leqslant 360$.

Answer x = ... [2]

12 $\mathscr{E} = \{x : x \text{ is a positive integer}\}$, $A = \{x : 3x - 2 < 15\}$, $B = \{x : 4x + 1 \geqslant 13\}$.

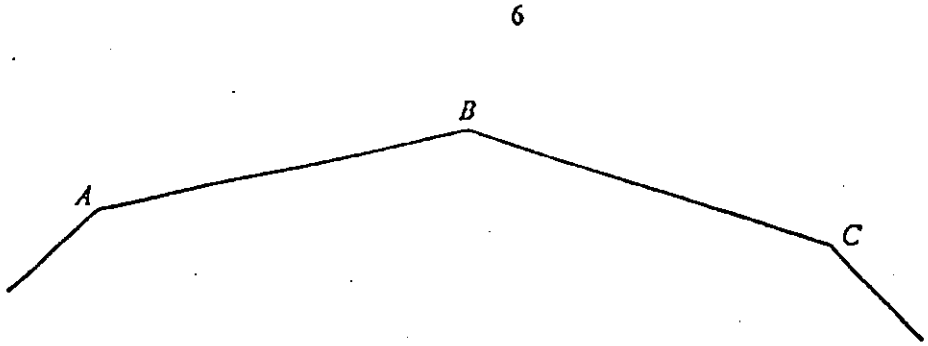
(a) Find $n(A)$.

Answer (a) $n(A)$ = ... [1]

(b) List the set $A \cap B$.

Answer (b) $A \cap B = \{$.....$\}$ [2]

13



NOT TO SCALE

A, B and C are 3 vertices of a regular 20-sided polygon.
Calculate (a) angle ABC,

Answer (a) Angle ABC = ... [2]

(b) angle ACB.

Answer (b) Angle ACB = ... [1]

---

14 The mass of an object is 50 g correct to the nearest 5 grams and the volume of the object is 9 cm^3 correct to the nearest cubic centimetre.

(a) Complete the following statements.

(i) ..... g $\leqslant$ mass $<$ ..... g. [1]

(ii) ..... $cm^3 \leqslant$ volume $<$ ..... cm^3. [1]

(b) Density $= \frac{\text{mass}}{\text{volume}}$. What is the least possible value of the density?

Answer (b) ..... g/cm^3 [1]

---

15 Find the values of p, q and r.

(a) $\sqrt{x^{36}} = x^p$,

Answer (a) p = ... [1]

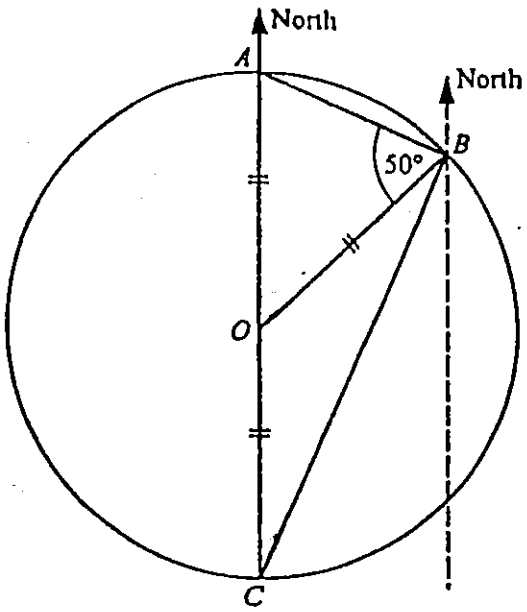
(b) $10^q = 1$,

Answer (b) q = ... [1]

(c) $r^{-\frac{1}{2}} = \frac{1}{4}$.

Answer (c) r = ... [1]

16



NOT TO SCALE

A, B and C are three markers each equidistant from O.
Angle $ABO = 50°$ and the direction COA is due North.

(a) Write down the value of angle OBC. *Answer (a)* Angle OBC = ... [1]

(b) Find the bearing of (i) B from A,

Answer (b)(i) ..... [1]

(ii) C from B.

Answer (b)(ii) ..... [1]

---

17 Make W the subject of the formula $\frac{T}{W+3} = V$.

Answer W =

..... [3]

---

18 There are 480 students in a school. One student is chosen at random.

The probability that the student is a boy is $\frac{5}{12}$.

The probability that the student is aged 15 or over is $\frac{3}{10}$.

The probability that the student is a girl under 15 is $\frac{7}{16}$.

Find (a) the number of girls,

Answer (a) ..... [1]

(b) the number of students under 15 years of age,

Answer (b) ..... [1]

(c) the number of boys aged 15 or over.

Answer (c) ..... [1]

19 $f(x) = x^2$ and $g(x) = 2x + 1$ for all values of x.

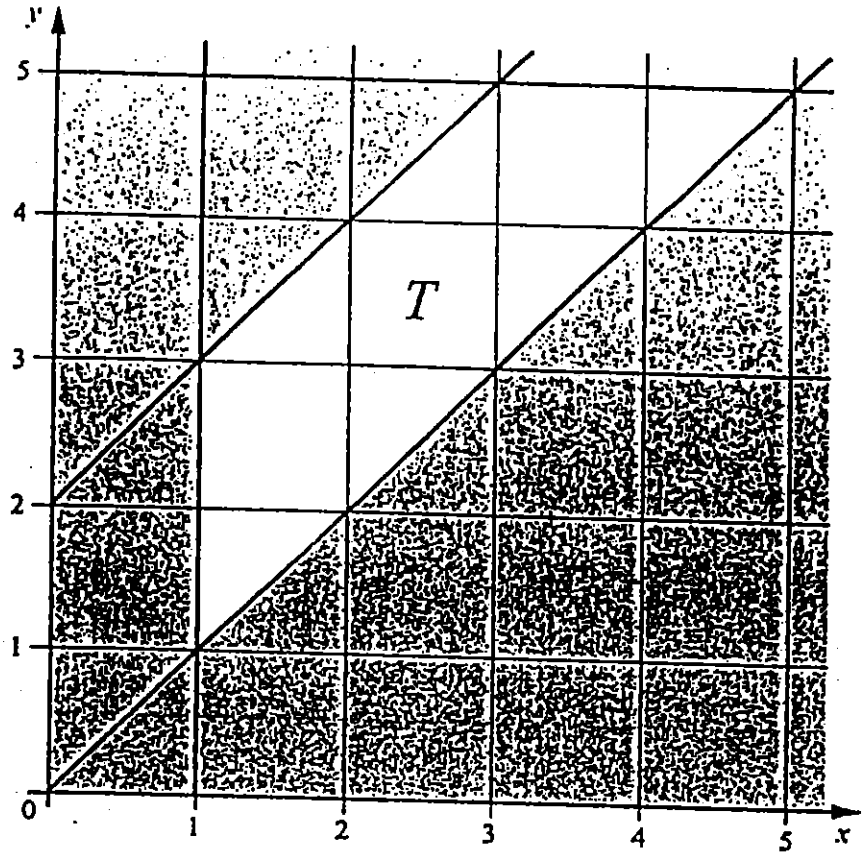
(a) Calculate $fg(5)$.

Answer (a) ..... [1]

(b) Find $g^{-1}(x)$.

Answer (b) $g^{-1}(x) =$ ..... [2]

20



The trapezium T is defined by four inequalities. One is $y \geqslant x$.
Write down the other three inequalities.

Answer .....

.....

..... [4]

21 Bruno's toy car is exactly similar to his father's real car.
The ratio of the surface areas real car : toy car is 36 : 1.

(a) (i) Write down the ratio of the lengths real car : toy car.

Answer (a)(i) ..... : ..... [1]

(ii) The toy car is 0.7 metres long. Calculate the length of the real car.

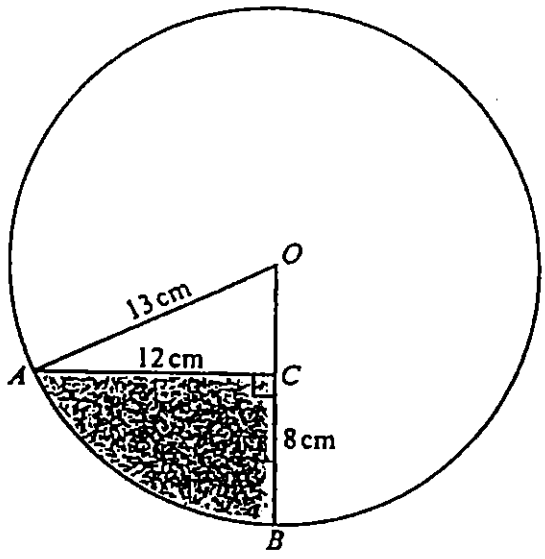
Answer (a)(ii) ..... m [1]

(b) The real car has a luggage space of 0.54 m^3.
Calculate the luggage space in the toy car in cubic metres.

Answer (b) ..... m^3 [2]

22

NOT TO SCALE



A circular disc has centre O and radius 13 cm. C is a point on OB such that $CB = 8$ cm, $CA = 12$ cm and angle $ACB = 90°$.

(a) Show that angle $AOC = 67.4°$.

Answer (a)

[1]

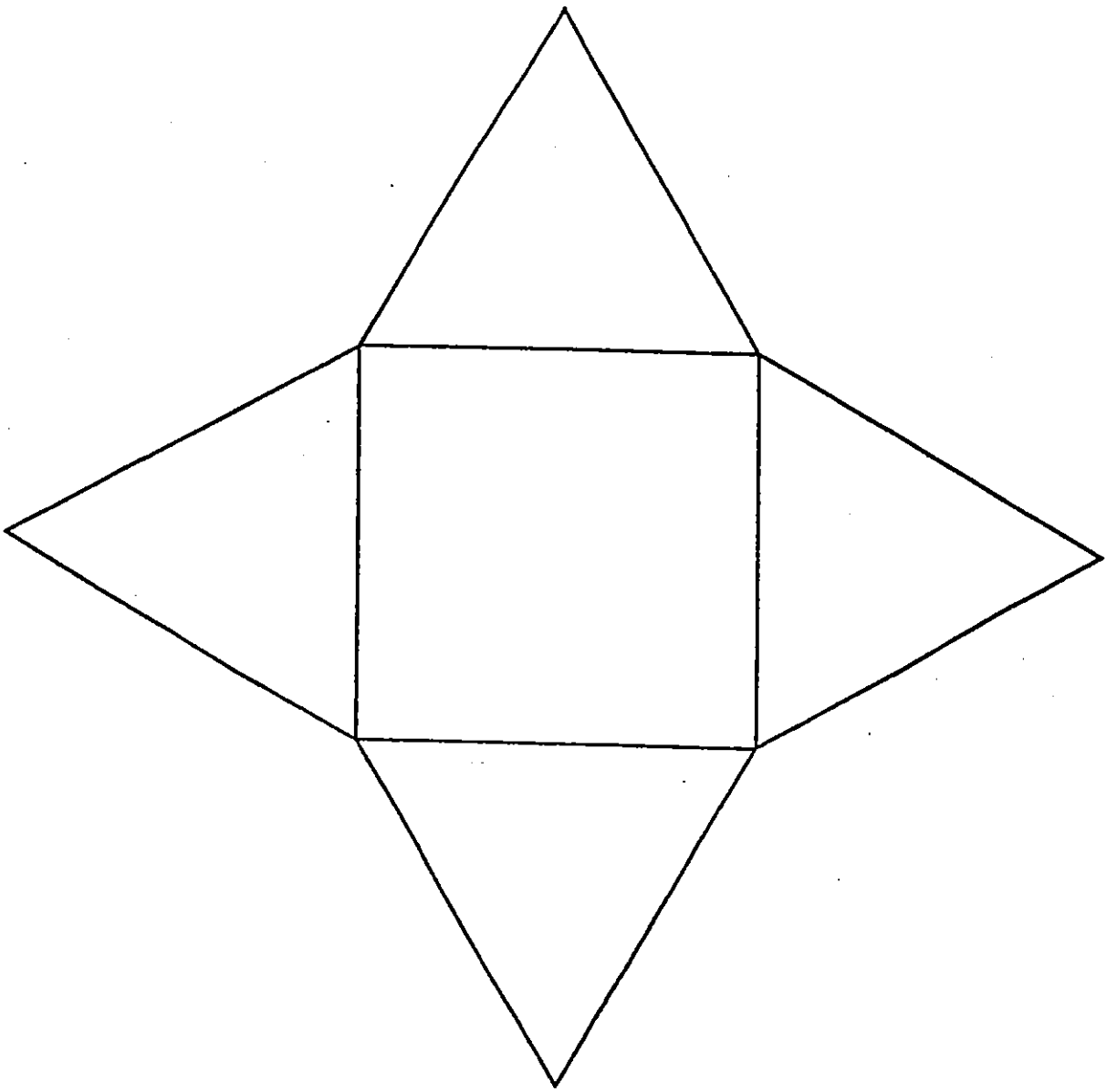
(b) Calculate (i) the area of sector AOB,
[For π, use either your calculator value or 3.142.]

Answer (b)(i) ..... cm^2 [2]

(ii) the shaded area ACB.

Answer (b)(ii) ..... cm^2 [2]

23



(a) This is the accurate net of a solid. Name the solid. *Answer (a)* ..... [1]

(b) Take suitable measurements and calculate the total surface area of the solid.
Show your working.

Answer (b) ..... cm^2 [3]

(c) The solid stands on its square base. Calculate its vertical height.

Answer (c) ..... cm [2]

24 Three positive integers are $(x - 1)$, x and $(x + 1)$.
When they are multiplied together the answer is 40 times their sum.

(a) (i) Write down an equation in x.

Answer (a)(i) ..... [1]

(ii) Show that your equation simplifies to $x^3 - 121x = 0$.

Answer (a)(ii)

[1]

(b) Factorise completely $x^3 - 121x$.

Answer (b) ..... [2]

(c) Find the three positive integers.

Answer (c) ..... [2]

247

Centre Number | Candidate Number

Candidate Name _____

International General Certificate of Secondary Education
UNIVERSITY OF CAMBRIDGE LOCAL EXAMINATIONS SYNDICATE

MATHEMATICS 0580/2, 0581/2

PAPER 2

Wednesday 4 NOVEMBER 1998 Afternoon 1 hour 30 minutes

Candidates answer on the question paper.
Additional materials:
Electronic calculator
Geometrical instruments
Mathematical tables (optional)

TIME 1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces at the top of this page.
Answer **all** questions.
Write your answers in the spaces provided on the question paper.
If working is needed for any question it must be shown below that question.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 70.
Electronic calculators should be used.
If the degree of accuracy is not specified in the question, and if the answer is not exact, the answer should be given to three significant figures. Answers in degrees should be given to one decimal place.
For π, use either your calculator value or 3.142.

FOR EXAMINER'S USE

This question paper consists of 9 printed pages and 3 blank pages.

1 $\cos A = \sqrt{\dfrac{1}{4-2\sqrt{2}}}$.

Calculate the value of angle A.

Answer Angle A = ... [2]

---

2 To make jam, you must use 3 kilograms of sugar with $2\frac{1}{2}$ kilograms of fruit.
Karen has 4 kilograms of fruit. How much sugar must she use with it to make jam?

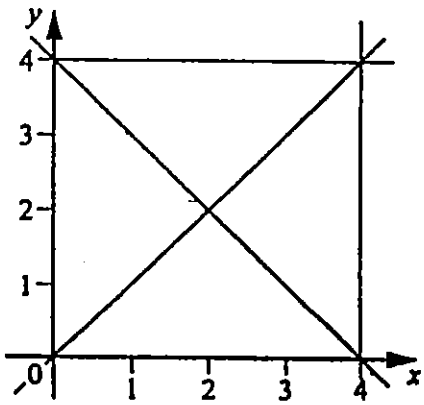
Answer ..... kg [2]

---

3 On the diagram below, show the region defined by the inequalities

$$y \geqslant x, \qquad y \leqslant 4 \qquad \text{and} \qquad x + y \geqslant 4,$$

by shading all the **unwanted** regions. Write R in the region required.



[2]

---

4 The median of $x-4$, x, $2x$ and $2x+12$ is 9, where x is a positive integer.
Find the value of x.

Answer x = ... [2]

249

5 To the nearest 20 centimetres, the radius of a circular pond is 220 centimetres.

(a) Between what limits must the radius, r centimetres, lie?

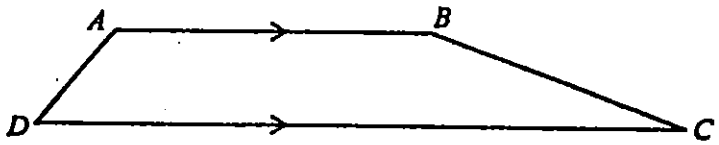
Answer (*a*) ..... $\leqslant r <$ ..... [1]

(b) Calculate the smallest possible circumference of the pond.
[For π, use either your calculator value or 3.142.]

Answer (*b*) ..... cm [2]

---

6 (a)



The quadrilateral $ABCD$ has AB parallel to DC. What is its special name?

Answer (*a*) ..... [1]

(b) In the space below, draw accurately a rhombus with sides of length 5 centimetres and with two of its angles 70°.

[2]

---

7 A train leaves Windhoek at 16 34 and arrives in Swakopmund at 20 34.
A new train will cut 20% off the journey time.
At what time will the 16 34 train now arrive in Swakopmund?

Answer ..... [3]

8 (a) Factorise $2x^2 - 5x - 3$.

Answer (*a*) ..... [2]

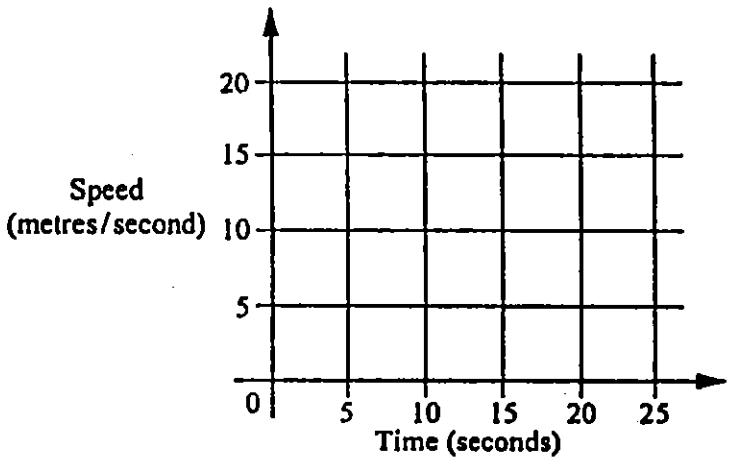
(b) Solve the equation $2x^2 - 5x - 3 = 0$.

Answer (*b*) $x =$ ..... or ..... [1]

---

9 A car accelerates steadily from rest to a speed of 20 metres per second in 15 seconds.

(a) Draw the speed–time graph on the grid below.



[1]

(b) Calculate the acceleration, in metres per second per second.

Answer (*b*) ..... m/s^2 [1]

(c) Calculate the distance travelled in these 15 seconds.

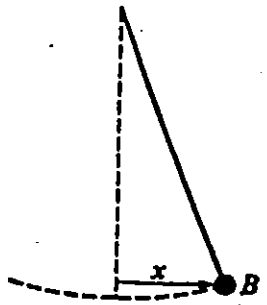
Answer (*c*) ..... m [1]

---

10 Simplify $\frac{x+3}{2} - \frac{x-4}{5}$.

Answer ..... [3]

11



The distance, x centimetres, of the bob (B) of a pendulum to the right of its vertical position is given by the formula

$$x = 4\cos(180t)^\circ,$$

where t is the time in seconds.

(a) Find the value of x when

(i) $t = 0.4$,

Answer (a) (i) $x =$ ..... [1]

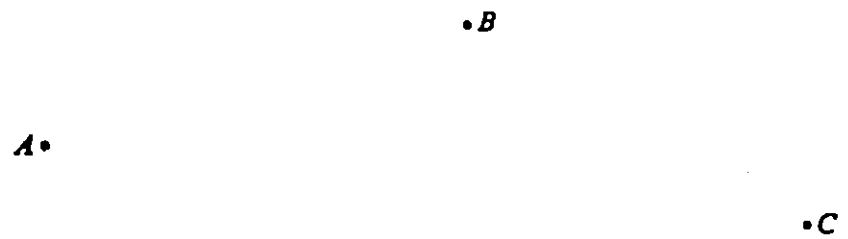
(ii) $t = 1.3$.

Answer (a) (ii) $x =$ ..... [1]

(b) What does a negative value of x mean?

Answer (b) ..... [1]

12

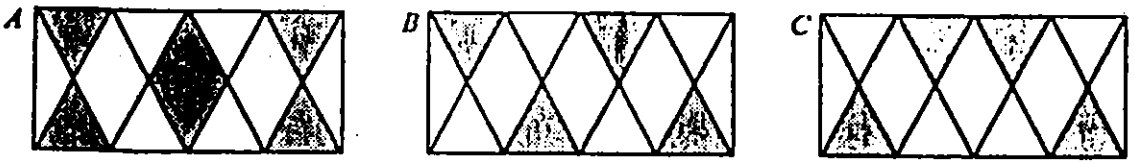


An earthquake is recorded at three measuring stations A, B and C.
The centre of the earthquake is approximately 50 kilometres from A, 70 kilometres from B and 80 kilometres from C.
Construct suitable loci, showing this information, using a scale of 1 centimetre to represent 10 kilometres.
Shade the region in which the centre of the earthquake was situated. [3]

0580/2, 0581/2/W98

13 (a) Which of the diagrams below does not have rotational symmetry?

Answer (*a*) ..... [1]



(b) Draw any lines of symmetry on each of the three diagrams above.
If a diagram has no line of symmetry, write NONE underneath it. [3]

---

14 The amount of light as you go deeper into a lake is given by the formula $\frac{L}{100} = (0.9)^{5d}$,

where d is the depth below the surface, in metres,
and L is the percentage of the amount of light at the surface of the lake.

(a) Find the value of L when

(i) $d = 1.4$,

Answer (*a*) (i) L = ...% [1]

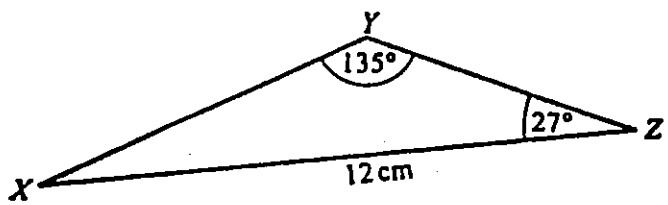
(ii) $d = 2.7$.

Answer (*a*) (ii) L = ...% [1]

(b) Find d when $L = 81$.

Answer (*b*) d = ... [2]

15



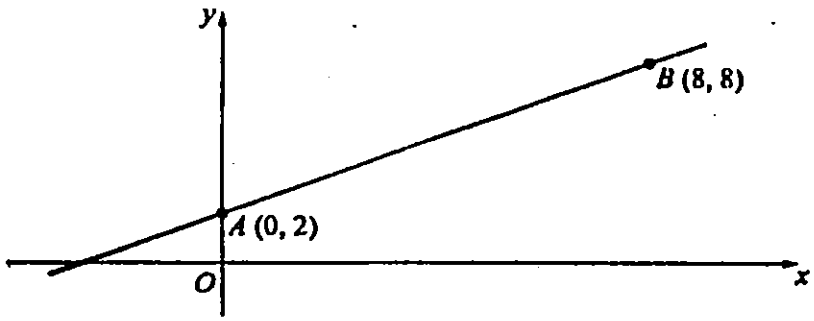
NOT TO SCALE

In triangle XYZ, angle $XYZ = 135°$, angle $YZX = 27°$ and $XZ = 12$ cm.
Calculate the length of YZ.

Answer YZ = ... cm [4]

---

16 The diagram, which is not drawn to scale, shows the graph of the function $y = mx + c$, which passes through the points A (0, 2) and B (8, 8).



(a) Find the value of m and the value of c.

Answer (a) m = ...

c = ... [3]

(b) Calculate the length of AB.

Answer (b) AB = ... [2]

17

CAR HIRE TERMS
$23 per day.
40 kilometres free for each day hired! Extra distance — $0.25 per kilometre.

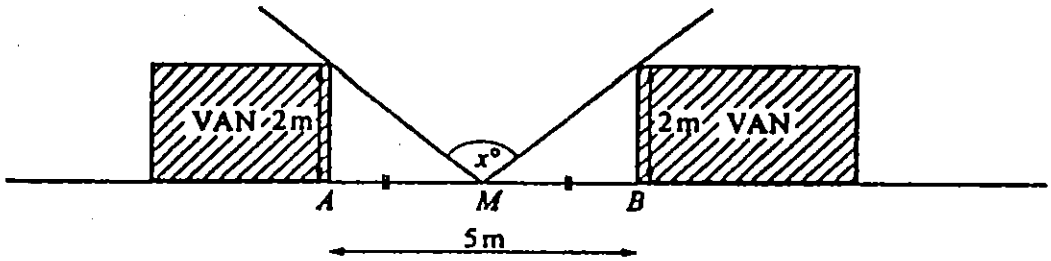
(a) Alphonse hires a car for 5 days and drives 350 kilometres.
Work out the total cost.

Answer (a) $ ..... [2]

(b) Bertrand hires a car for p days and drives q kilometres.
Find an expression for the cost, in terms of p and q, and simplify your answer.
(Assume that Bertrand drives more than 40 kilometres each day.)

Answer (b) $ ..... [3]

18 Two vans, 5 metres apart and each 2 metres wide, are parked at the side of a road. The diagram shows the vans from above.



(a) A man stands on the pavement at M, halfway between A and B. Calculate his angle of view ($x°$).

Answer (*a*) x = ... [3]

(b) Calculate his angle of view if he stood at the point B.

Answer (*b*) ..... [2]

---

19 The height, h centimetres, reached by a ball thrown vertically upwards is proportional to the square of the speed, V metres per second, with which it is thrown.

When $V = 4$, $h = 80$.

(a) Explain why the formula connecting h and V is $h = 5V^2$.

Answer (*a*)

[2]

(b) Find

(i) the height reached by a ball thrown upwards at 6 metres per second,

Answer (*b*) (i) ..... cm [1]

(ii) the speed with which a ball is thrown if it reaches a height of 20 metres.

Answer (*b*) (ii) ..... m/s [2]

---

20 (a) Show, by **calculation**, that the size of each interior angle of a regular nine-sided polygon is 140°.

Answer (*a*)

[2]

(b) A regular nine-sided polygon *ABCDEFGHI* has side *EF* drawn accurately below.

(i) Draw accurately sides *DE*, *CD* and *FG*.

E _____ *F*

[1]

(ii) Join *CG*.

Measure and write down the size of angles *DCG* and *FGC*.

Answer (*b*) (ii) Angle *DCG* = ...

Angle *FGC* = ... [1]

(iii) Show by calculation that your answers in part (b) (ii) are correct.

Answer (*b*) (iii)

[2]

Centre Number | Candidate Number

Candidate Name _____

International General Certificate of Secondary Education
UNIVERSITY OF CAMBRIDGE LOCAL EXAMINATIONS SYNDICATE

MATHEMATICS 0580/2, 0581/2

PAPER 2

Tuesday **8 JUNE 1999** Morning 1 hour 30 minutes

Candidates answer on the question paper.
Additional materials:
Electronic calculator
Geometrical Instruments
Mathematical tables (optional)

TIME 1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces at the top of this page.

Answer **all** questions.

Write your answers in the spaces provided on the question paper.

If working is needed for any question it must be shown below that question.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [ ] at the end of each question or part question.

The total of the marks for this paper is 70.

Electronic calculators should be used.

If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.

For π, use either your calculator value or 3.142.

FOR EXAMINER'S USE

This question paper consists of 11 printed pages and 1 blank page.

MEK (0706) QF91681

1 Work out $\dfrac{\frac{1}{8}+\frac{1}{2}}{\frac{5}{6}}$.

Answer ..... [1]

---

2 The speed of light is 300 000 kilometres per second.

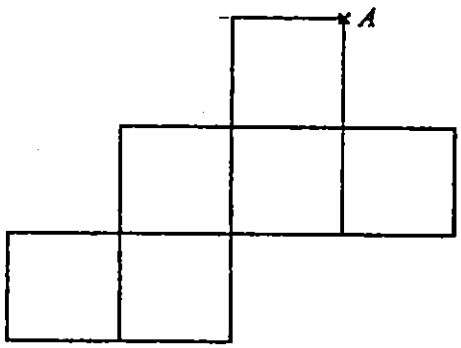
(a) Write 300 000 in standard form.

Answer (a) ..... [1]

(b) The nearest star, Proxima Centauri, is 4.2 light years from the Sun. One light year is the distance light travels in 365 days. Calculate the distance of Proxima Centauri from the Sun.
Give your answer in kilometres in standard form.

Answer (b) ..... km [1]

3



The diagram shows a net of a cube. One corner is marked and labelled A.
Mark and label A' the two points on the diagram which will touch the point A when the net is folded to make the cube. [2]

---

4 In a 1500 m race, Fernando came second in a time of 3 minutes 58.2 seconds.
Eduardo came first, 0.9 seconds ahead of Fernando.
Henri was third, 3.1 seconds behind Fernando.
Write down

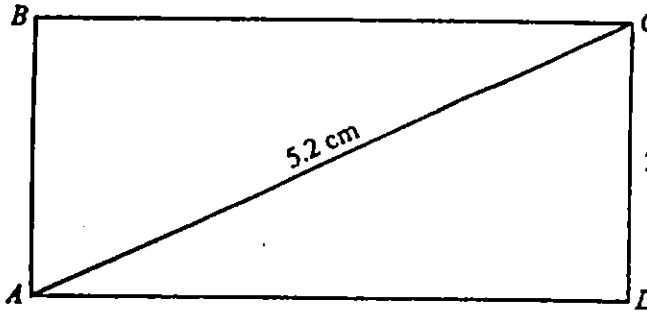
(a) Eduardo's time,

Answer (a) ..... min ..... s [1]

(b) Henri's time.

Answer (b) ..... min ..... s [1]

5



NOT TO SCALE

ABCD is a rectangle with $AC = 5.2$ cm and $CD = 2.3$ cm, both measured to the nearest millimetre. Complete the following statements.

(a) ..... cm $\leqslant AC <$ ..... cm. [1]

(b) The least value of AD is $\sqrt{(.....)^2 - (.....)^2}$ cm. [1]

---

6 An organisation spends 10% of its income on administration and uses the rest for charitable work. In 1998 it used \$234 000 for charitable work. Calculate its income in 1998.

Answer \$ ..... [2]

---

7 The volume of the planet Uranus is 64 times the volume of the planet Earth. Assuming that Uranus and Earth are geometrically similar, calculate the ratio of

Surface area of Uranus : **Surface area** of Earth in the form $n : 1$.

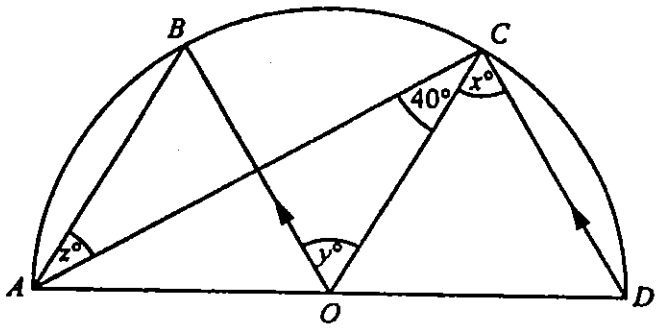
Answer ..... : 1 [2]

---

8 Make y the subject of the formula $x = \sqrt{(y^3 + 3)}$.

Answer $y =$ ..... [3]

9



NOT TO SCALE

AOD is the diameter of semicircle $ABCD$. Angle $ACO = 40°$ and DC is parallel to radius OB. Find the values of x, y and z.

Answer $x =$ .....

$y =$ .....

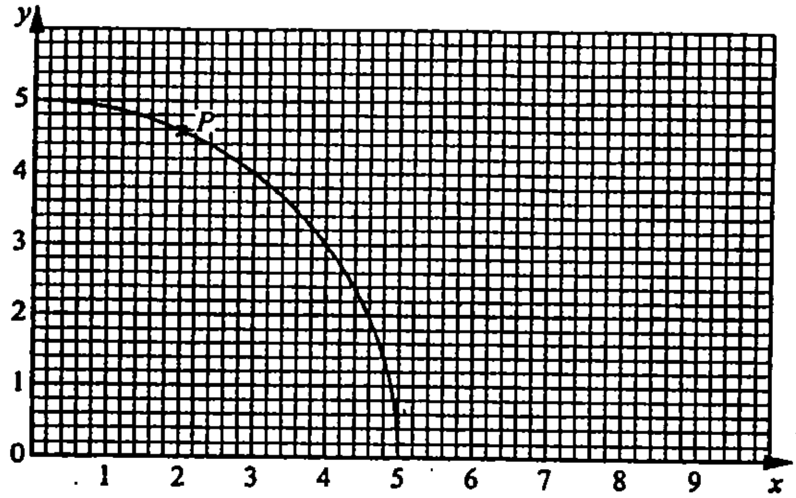
$z =$ ..... [3]

10 Paula wishes to change 1000 francs into dollars. She has a choice of two methods.
Method A: exchange 1000 francs at a rate of \$1 = 4.15 francs.
Method B: pay 20 francs commission and then exchange the rest at a rate of \$1 = 4.00 francs.
Calculate which method gives her more dollars.
Write down, correct to two decimal places, how many more dollars she gets.

Answer Method ..... gives \$ ..... more. [3]

For Examiner's Use

11



P is the point on the curve where $x = 2$. Draw a suitable line on the grid and use it to calculate the gradient of the curve at P.

Answer Gradient = ... [3]

12 Three estimates for the volume of water in a bucket are given below.

9 litres, $7000\ cm^3$ and $0.0009\ m^3$.

(a) Arrange these in order of size, starting with the smallest.

Answer (a) .... < .... < .... [2]

(b) The actual volume is 3 litres. Which estimate is the closest?

Answer (b) .... [1]

13 In a polygon with n sides, half the interior angles are each 150° and the other half are each 170°. Calculate the value of n.

Answer n = ... [3]

14 $f(x) = 2x + 1$ and $g(x) = x^2 + 3$.

(a) Find

(i) $f(-5)$,

Answer (a)(i) $f(-5) =$ ..... [1]

(ii) $g[f(-5)]$.

Answer (a)(ii) $g[f(-5)] =$ ..... [1]

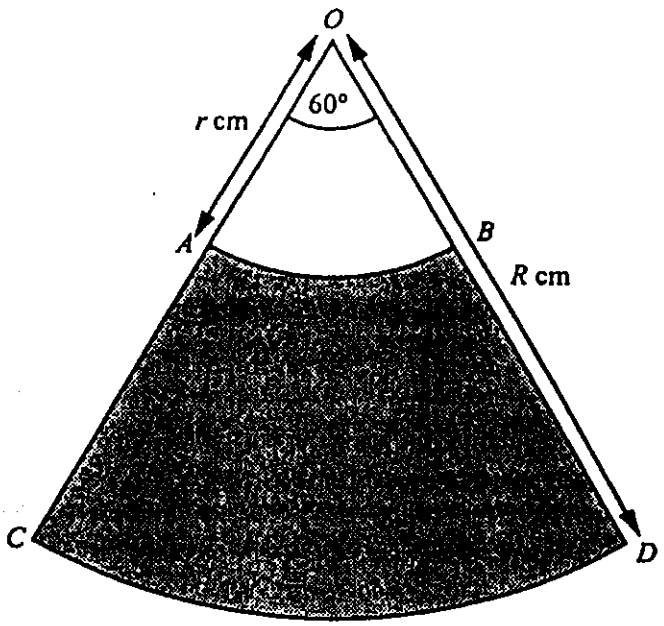
(b) Find and simplify $g[f(x)]$.

Answer (b) $g[f(x)] =$ ..... [2]

15 Solve the equation $2x^2 + 4x - 3 = 0$, giving your answers correct to 2 decimal places. **Show all your working.**

Answer $x =$ ..... or $x =$ ..... [4]

16



The shaded part of the diagram is formed by removing the sector OAB, radius r cm, from the larger sector OCD, radius R cm. The angle at O is 60°.

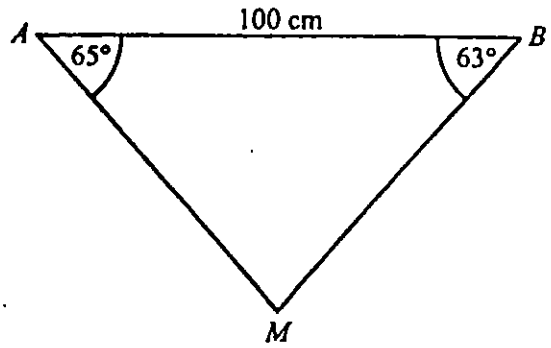
(a) Write down an expression for the shaded area in terms of π, R and r.

Answer (a) Shaded area = ... cm^2 [2]

(b) Factorise completely your answer to part (a).

Answer (b) ..... cm^2 [2]

17



NOT TO SCALE

In triangle ABM, $AB = 100$ cm, angle $MAB = 65°$ and angle $ABM = 63°$.

(a) Write down with a reason, but no calculation, which is the shorter length, AM or BM.

Answer (a) ..... is shorter because ..... [1]

(b) Calculate the length of BM.

Answer (b) $BM =$ ..... cm [3]

---

18 Richard is climbing a mountain. The temperature (T °C) is directly proportional to the height (h metres) above the base camp.
When he is 500 m above the base camp, the temperature is -5 °C.

(a) Find an equation connecting T and h.

Answer (a) ..... [2]

(b) The base camp is 2500 m above sea level.

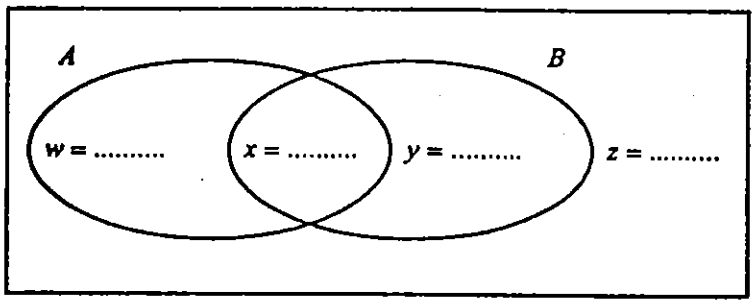
(i) The temperature at the top of the mountain is -18 °C.
Find the height of the top of the mountain above sea level.

Answer (b)(i) ..... m [1]

(ii) Find the temperature at sea level.

Answer (b)(ii) ..... °C [1]

19



100 people were asked which magazines they read.
Half of those asked read neither magazine A nor magazine B.
27 read magazine A and 43 read magazine B.

(a) Calculate how many people read both magazines.
Write your answer in the appropriate place in the Venn diagram above.

[1]

(b) Fill in the other missing numbers in the Venn diagram. [2]

(c) In set notation, $w = n(A \cap B')$. Write down an expression for z in set notation.

Answer $z =$ ..... [1]

---

20 Simplify

(a) $(64x^8)^{\frac{1}{2}}$.

Answer (a) ..... [2]

(b) $\dfrac{3x^2}{x^2 + 3x}$.

Answer (b) ..... [2]

For Examiner Use

21 $\mathbf{A} = \begin{pmatrix} 4 & x \\ -3 & 6 \end{pmatrix}$, $\mathbf{B} = \begin{pmatrix} 5 & -3 \\ -2 & 2 \end{pmatrix}$, $\mathbf{C} = \begin{pmatrix} 6 & 2 \\ y & 21 \end{pmatrix}$.

(a) . If $\mathbf{AB} = \mathbf{C}$, find the value of x and the value of y.

Answer (a) $x =$ .....

$y =$ ..... **[3]**

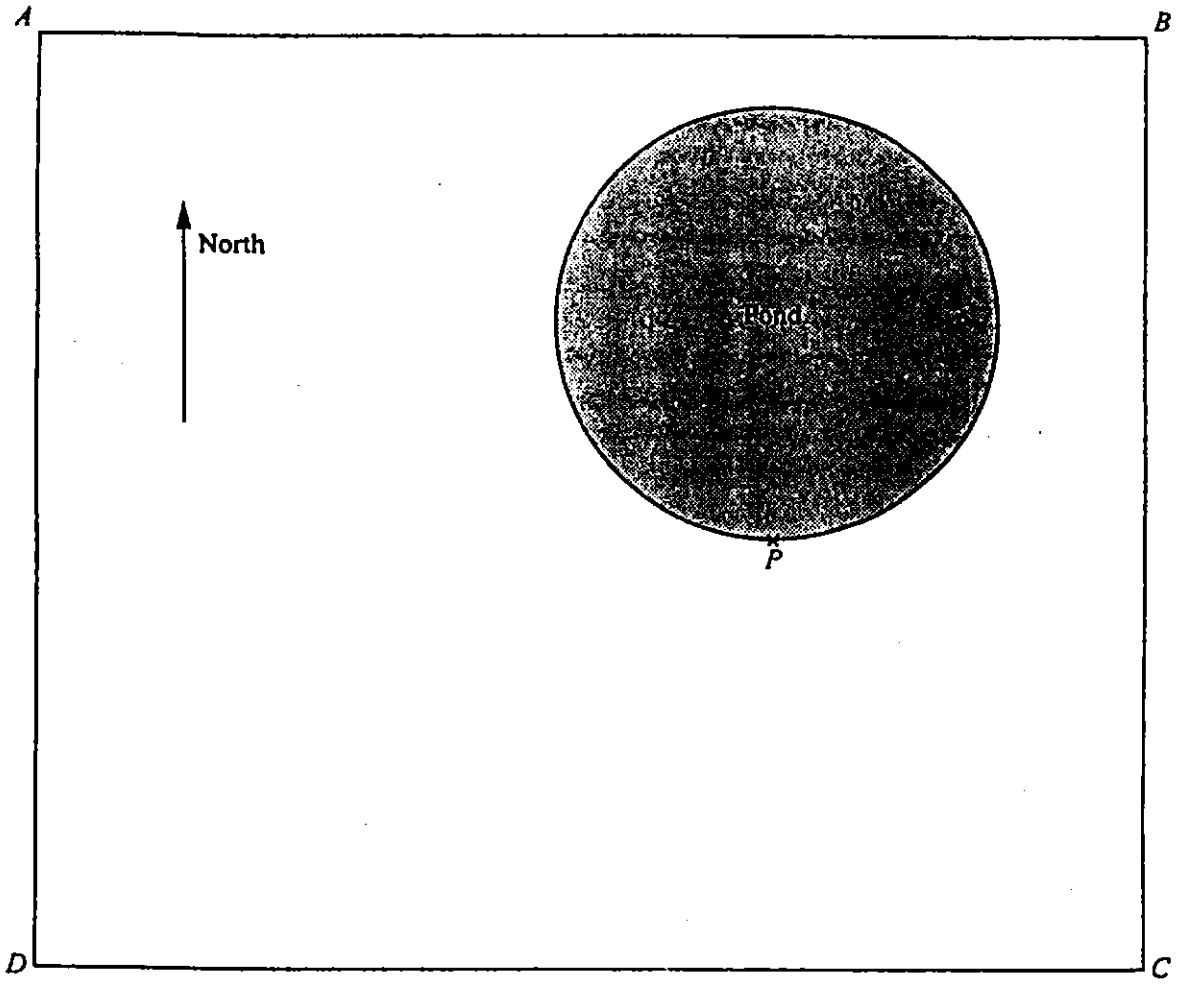
(b) Find $\mathbf{B}^{-1}$, the inverse of B.

Answer (b) $\mathbf{B}^{-1} =$ $\begin{pmatrix} & \\ & \end{pmatrix}$

[2]

22

Scale 1 cm represents 10 m



A rectangular park *ABCD* contains a circular pond. The diagram above is a scale drawing where 1 cm represents 10 m. Petra and Martha have instructions for a treasure hunt.

(a) Petra walks from *C* to the point *P* at the edge of the pond.
Find, by measuring an appropriate angle, the bearing of *P* from *C*.

Answer (a) Bearing = ... [1]

(b) Martha starts from *D* and walks for 80 m on a bearing of 055°.
Mark her position with a cross and label it *M*. [1]

(c) (i) Draw the locus of points 25 m from *M*. [1]

(ii) Draw the locus of points equidistant from *M* and *P*. [2]

(d) The treasure is hidden less than 25 m from *M* but nearer to *P* than *M*.
Shade the area where the treasure can be found. [1]

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Centre Number

Candidate Name _____

International General Certificate of Secondary Education
UNIVERSITY OF CAMBRIDGE LOCAL EXAMINATIONS SYNDICATE

MATHEMATICS 0580/2, 0581/2

PAPER 2

Wednesday 3 NOVEMBER 1999 Afternoon 1 hour 30 minutes

Candidates answer on the question paper.
Additional materials:
Electronic calculator
Geometrical instruments
Mathematical tables (optional)

TIME 1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces at the top of this page.
Answer **all** questions.
Write your answers in the spaces provided on the question paper.
If working is needed for any question it must be shown below that question.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 70.
Electronic calculators should be used.
If the degree of accuracy is not specified in the question, and if the answer is not exact, the answer should be given to three significant figures. Answers in degrees should be given to one decimal place.
For π, use either your calculator value or 3.142.

FOR EXAMINER'S USE

This question paper consists of 11 printed pages and 1 blank page.

MFK (0811) QK93684

1 The sea level at low tide is -2.40 metres.
What is the sea level when it is 1.97 metres above this?

Answer ..... m [1]

2 **Solve the inequality** $3(x + 1) \geqslant 5 - x$.

Answer x ..... [2]

3 Elena invests \$560 at 5.5% per annum simple interest.
Calculate the number of years it will take to earn \$123.20 interest.

Answer ..... [2]

4 $x = 0.083$, $y = \frac{84}{991}$ and $z = 8.4 \times 10^{-3}$.
Write x, y and z in order, with the **smallest** first.

Answer ..... < ..... < ..... [2]

5 By writing each number in the calculation below correct to two significant figures, **estimate** the value of

$$\frac{478 \times 49.82}{0.1248}.$$

Answer ..... [2]

---

6 In 1998 the same cycle cost 1600 French francs in Paris and £170 (pounds) in London.
One pound was equal to 9.30 French francs.
In which city did the cycle cost less and by how much?
Give your answer either in French francs or in pounds.

Answer City .....

Amount ..... [2]

---

7 The perimeter of an equilateral triangle is 65 cm, to the nearest centimetre.
Find the smallest possible length of a side of the triangle.

Answer ..... cm [2]

---

8 Solve the simultaneous equations $3x - y = -3$,

$9x + 2y = 1$.

Answer $x =$ .....

$y =$ ..... [3]

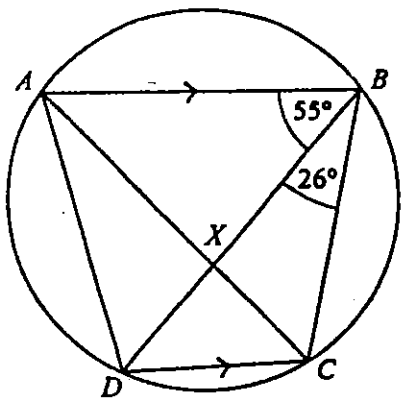
---

9 A is the point (1, 0) and B is the point (4, 6).
Calculate the acute angle that the line AB makes with the x-axis.

Answer ..... [3]

---

10 $ABCD$ is a cyclic quadrilateral in which AB is parallel to DC.
The diagonals AC and BD meet at X.
Angle $ABD = 55°$ and angle $DBC = 26°$.



NOT TO SCALE

Work out

(a) angle BCD,

Answer (a) angle $BCD =$ ..... [1]

(b) angle BXC,

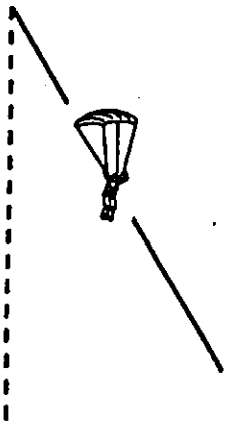
Answer (b) angle $BXC =$ ..... [1]

(c) angle ADB.

Answer (c) angle $ADB =$ ..... [1]

---

11 Vanessa does a parachute jump. There is a wind blowing which makes her fall in a straight line at an angle of 13° to the vertical.
She travels 1800 m along this straight line.
Calculate the vertical distance she falls, giving your answer to the **nearest metre.**



NOT TO SCALE

Answer ..... m [3]

12 **Simplify** $\frac{ax - ay}{px - py + qx - qy}$.

Answer ..... [3]

13 Two water containers are similar in shape.
When they are full one holds 3 litres and the other holds 24 litres.
The height of the smaller container is 15.5 cm.
Work out the height of the larger container.

Answer ..... cm [3]

14 F is proportional to the square of v.
When $F = 180$, $v = 6$.
Calculate F when $v = 3$.

Answer $F =$ ..... [3]

15 By construction, using ruler and compasses only, find the region which contains all the points which are less than 4 cm from P **and** nearer to P than to Q.
Shade this region.

[4]

273

16 Simplify

(a) $2x^4 \times 5x$,

Answer (a) ..... [1]

(b) $x^2 + x^{\frac{1}{2}}$,

Answer (b) ..... [1]

(c) $(\sqrt{2x})^6$.

Answer (c) ..... [2]

---

17 Solve the equation $x^2 - 2x - 5 = 0$, giving your answers correct to 2 decimal places.
Show all your working.

Answer $x =$ ..... or ..... [4]

---

18 Given the matrices $\mathbf{M} = \begin{pmatrix} 2 & -3 \\ 4 & -5 \end{pmatrix}$ and $\mathbf{N} = \begin{pmatrix} 2 \\ 5 \end{pmatrix}$, work out

(a) MN,

Answer (a) MN = [2]

(b) $\mathbf{M}^{-1}$, the inverse of M.

Answer (b) $\mathbf{M}^{-1}$ = [2]

---

19 Given the functions $f : x \mapsto 2x - 7$ and $g : x \mapsto \frac{x+1}{x}$, where $x \neq 0$, find

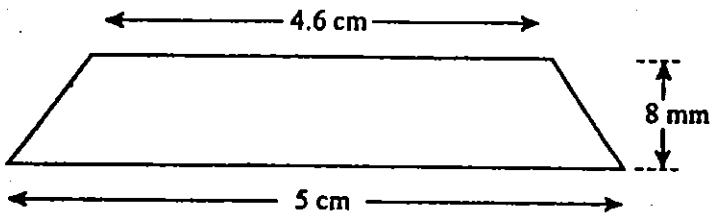
(a) the value of fg(2),

Answer (a) ..... [1]

(b) fg(x), giving your answer as a single fraction.

Answer (b) ..... [3]

20



NOT TO SCALE

The diagram shows an isosceles trapezium which is the cross-section of a bar of chocolate.

(a) Calculate the area of the cross-section, in square centimetres.

Answer (a) .....cm^2 [2]

(b) The bar of chocolate is a prism and its length is 9.5 cm.
Calculate its volume, to the nearest cubic centimetre.

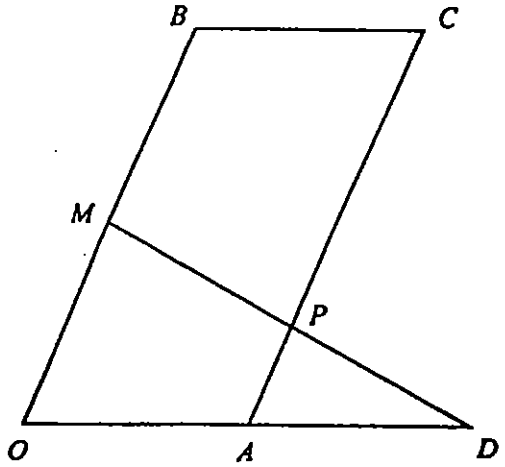
Answer (b) ..... cm^3 [2]

(c) How many planes of symmetry does the bar of chocolate have?

Answer (c) ..... [1]

10

21



OACB is a parallelogram and *DPM* is a straight line.

O is the origin, $\overrightarrow{OA} = \mathbf{a}$ and $\overrightarrow{OB} = \mathbf{b}$.

$\overrightarrow{OD} = 2\overrightarrow{OA}$ and $\overrightarrow{OM} = \frac{1}{2}\overrightarrow{OB}$.

(a) Find $\overrightarrow{DM}$ in terms of **a** and **b**.

Answer (a) $\overrightarrow{DM} =$ ..... [2]

(b) What can you say about triangles *ADP* and *ODM*?

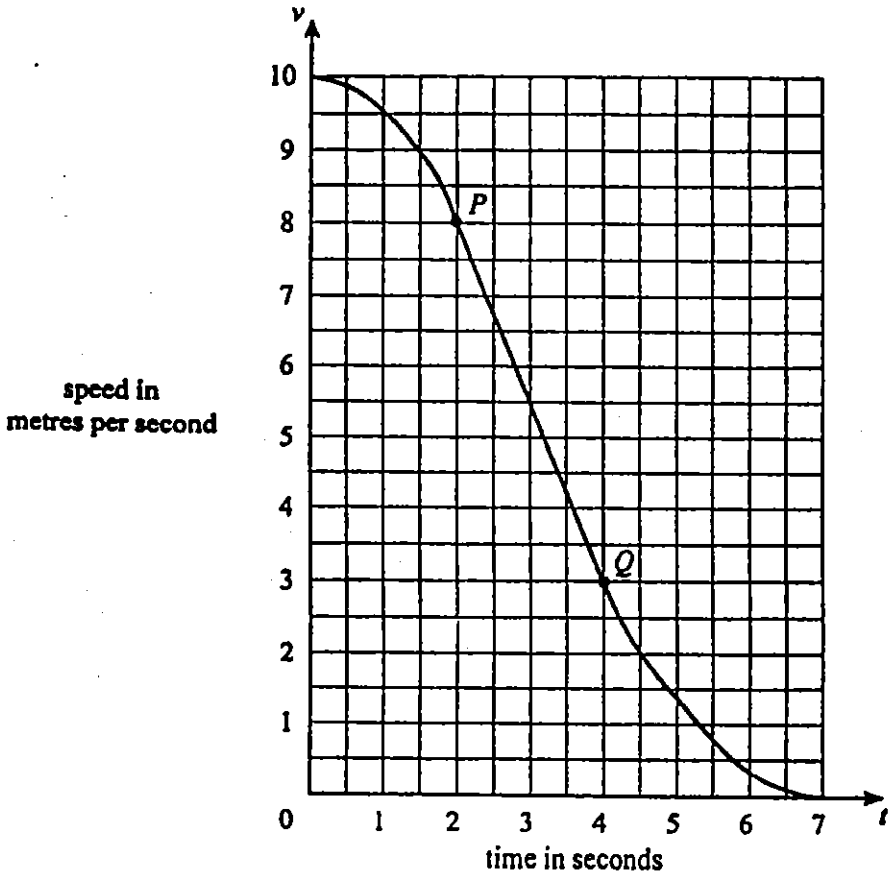
Answer (b) ..... [1]

(c) Find $\overrightarrow{OP}$, the position vector of *P*, in terms of **a** and **b**.

Answer (c) $\overrightarrow{OP} =$ ..... [2]

22

277



The speed–time graph shows how a car comes to rest in 7 seconds.
The part of the graph labelled PQ is a straight line.
Work out

(a) the deceleration of the car between $t = 2$ and $t = 4$,

Answer (a) ..... m/s^2 [2]

(b) the distance travelled by the car between $t = 2$ and $t = 4$,

Answer (b) ..... m [2]

(c) the speed of the car in kilometres per hour when $t = 0$.

Answer (c) ..... km/h [2]

278

Centre Number | Candidate Number

Candidate Name _____

International General Certificate of Secondary Education
UNIVERSITY OF CAMBRIDGE LOCAL EXAMINATIONS SYNDICATE

MATHEMATICS 0580/2, 0581/2

PAPER 2

MAY/JUNE SESSION 2000 1 hour 30 minutes

Candidates answer on the question paper.
Additional materials:
Electronic calculator
Geometrical Instruments
Mathematical tables (optional)
Tracing paper (optional)

TIME 1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces at the top of this page.

Answer all questions.

Write your answers in the spaces provided on the question paper.

If working is needed for any question it must be shown below that question.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [ ] at the end of each question or part question.

The total of the marks for this paper is 70.

Electronic calculators should be used.

If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.

For π, use either your calculator value or 3.142.

FOR EXAMINER'S USE

This question paper consists of 12 printed pages.

[Turn over

1 The height of Mont Blanc is 4810 m, correct to the nearest 10 m. What is its least possible height?

Answer ..... m [1]

---

2 Find the mean of the next two prime numbers after 29.

Answer ..... [1]

---

3 A television advertisement claims "Because the earth is rotating at over 1000 miles per hour, you will travel over 650 million miles in a lifetime".
Calculate, to the nearest year, the length of a "lifetime".

Answer ..... years [2]

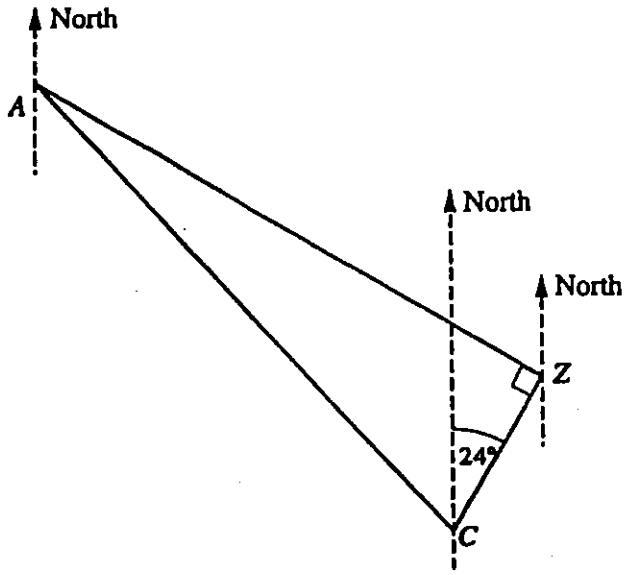
---

4 $x = 3.4 \times 10^{-3}$, $y = 1.2 \times 10^{-1}$ and $z = 4.6 \times 10^{-4}$.
Place one of the symbols $>$, $=$ or $<$ in the spaces below to make each statement correct.

(a) x ..... y, [1]

(b) $x + y$ ..... z. [1]

5



The diagram shows the positions of Cairo (C), Alexandria (A) and Zagazig (Z).
The bearing of Z from C is 024° and angle AZC is 90°.
Find the bearing of

(a) C from Z,

Answer (a) ..... [1]

(b) Z from A.

Answer (b) ..... [1]

---

6 In the 1998 Grand Prix in Australia, Mika Hakkinen completed the fastest lap in a time of 1 minute 31.649 seconds. His average speed was 208.303 kilometres per hour for that lap. Calculate the length of the lap, to the nearest metre.

Answer ..... m [2]

[Turn over

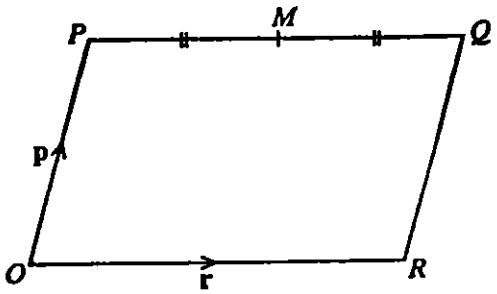
7 (a) Write $(8x^4y)^2$ without brackets.

Answer (a) ..... [1]

(b) Simplify $(8x^4y)^2 + x^2y^{-1}$.

Answer (b) ..... [2]

8



NOT TO SCALE

(a) *OPQR* is a parallelogram and *M* is the midpoint of *PQ*.
Vector $\overrightarrow{OP}$ = **p** and vector $\overrightarrow{OR}$ = **r**.
Write in terms of **p** and/or **r**

(i) $\overrightarrow{QM}$,

Answer (a)(i) $\overrightarrow{QM}$ = ... [1]

(ii) $\overrightarrow{RM}$.

Answer (a)(ii) $\overrightarrow{RM}$ = ... [1]

(b) The position of *R* is 3 units due east of *O*, so that the column vector $\overrightarrow{OR} = \begin{pmatrix} 3 \\ 0 \end{pmatrix}$.

The position of *S* is 3 units due south of *O*.
Write down the column vector $\overrightarrow{OS}$.

Answer (b) $\overrightarrow{OS} = \begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [1]

---

9 A class has fewer than 30 students.
Exactly $\frac{2}{3}$ of the students in the class own a football.
Exactly $\frac{7}{8}$ of the students in the class own football boots.

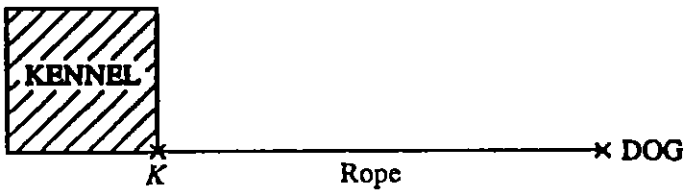
(a) How many students are in the class?

Answer (a) ..... [1]

(b) What is the smallest number of these students who own **both** a football **and** football boots?

Answer (b) ..... [2]

10



A dog is tied to one corner (K) of a fixed square kennel by a rope. This is shown in the scale diagram above.
Draw accurately on the diagram the path of the dog as it moves **anticlockwise** around the kennel with the rope always tight. [3]

---

11 Claudia records the midday temperature from Monday to Friday. She finds that the mean temperature is 0°C, the mode is −2.4°C and the median is −1.3°C. The temperature either stays the same or increases each day and the maximum temperature is 4.5°C. Fill in the temperatures in the table below.

Day	Monday	Tuesday	Wednesday	Thursday	Friday
Temperature (°C)					

[3]

---

12 Find the value of x, y and z when

(a) $3^x = 1$,

Answer (a) $x =$ ..... [1]

(b) $10^y = 0.01$,

Answer (b) $y =$ ..... [1]

(c) $16^z = 2$.

Answer (c) $z =$ ..... [1]

---

13 (a) Dina bought a car from a salesman for \$8400.
When Dina sells the car she makes a loss of $22\frac{1}{2}$%.
For how much did she sell the car?

Answer (a) \$ ..... [1]

(b) The salesman made a profit of 40% when he sold the car for \$8400.
How much did he pay for the car?

Answer (b) \$ ..... [2]

---

14 $f(x) = 3 + \sqrt{2x}$, for $x > 0$.

Find $f^{-1}(x)$.

Answer $f^{-1}(x) =$

..... [3]

---

15 The brightness (B) of an object varies inversely as the square of the distance (d) of the object from a light.
When $d = 12$, $B = 2$.

(a) Find an equation connecting B and d.

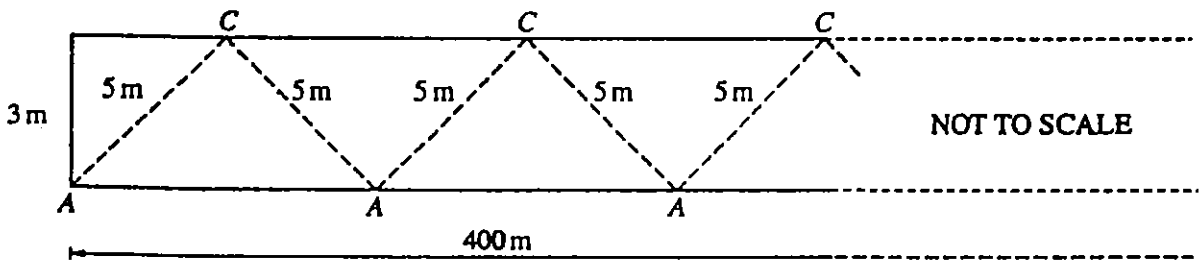
Answer (a) ..... [2]

(b) Find the value of B when $d = 3$.

Answer (b) ..... [1]

---

16 To celebrate the year 2000, a city planted apple trees (A) and cherry trees (C) on a rectangular strip of land 3 metres wide and 400 metres long. The trees were planted as shown in the diagram.



Calculate the number of

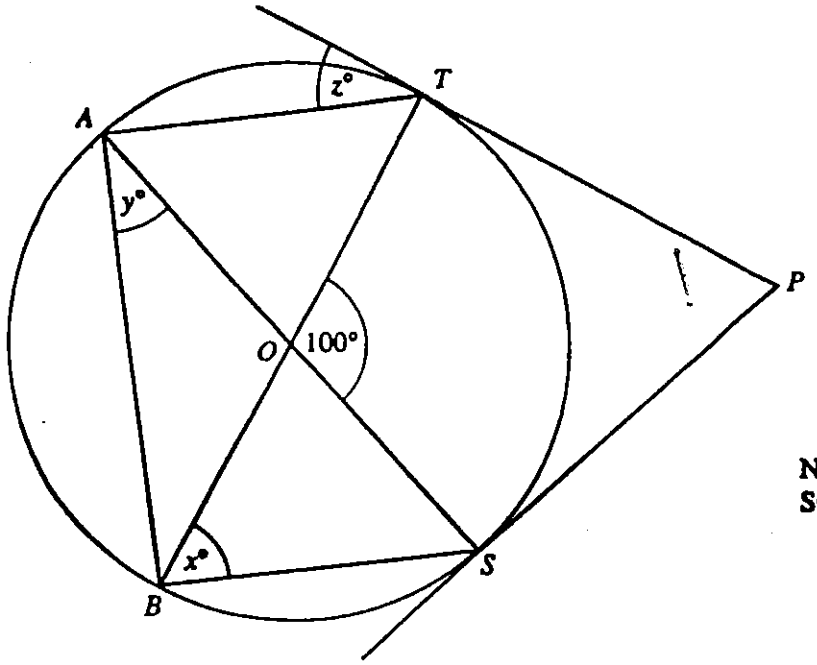
(a) apple trees,

Answer (a) ..... [3]

(b) cherry trees.

Answer (b) ..... [1]

17



NOT TO SCALE

PT and *PS* are tangents to a circle centre *O*. *TOB* and *AOS* are diameters and angle *TOS* = 100°.

(a) Find the values of x, y and z.

Answer (a) x = ... [1]

y = ... [1]

z = ... [1]

(b) Is *AS* parallel to *TP*? Give a reason for your answer.

Answer (b) ..... [1]

---

18 Omar buys one present each for Alex, Bukki and Chris. The present for Alex costs twice as much as the present for Chris, but only costs three quarters as much as the present for Bukki.

(a) Write, in its simplest form, the ratio of the costs of the presents for Alex : Bukki : Chris.

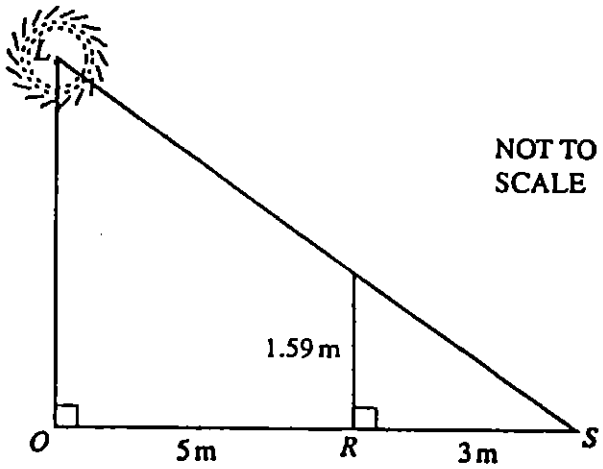
Answer (a) ..... : ..... : ..... [2]

(b) Omar spent $21.25 altogether for the three presents. What was the cost of the present for Bukki?

Answer (b) $..... [2]

---

19 (a)



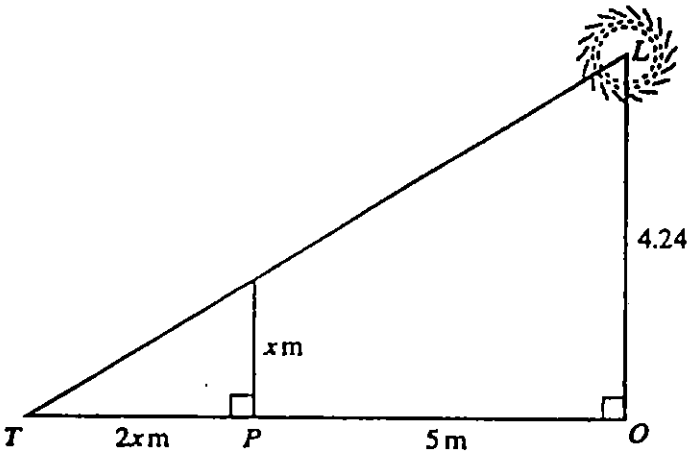
Robert stands at the point *R* on level ground, 5 metres from the base of a lamppost *OL*. Robert is 1.59 m tall and his shadow *RS* is 3 m long.

Show by calculation that the height of the lamppost *OL* is 4.24 m.

Answer (a)

[2]

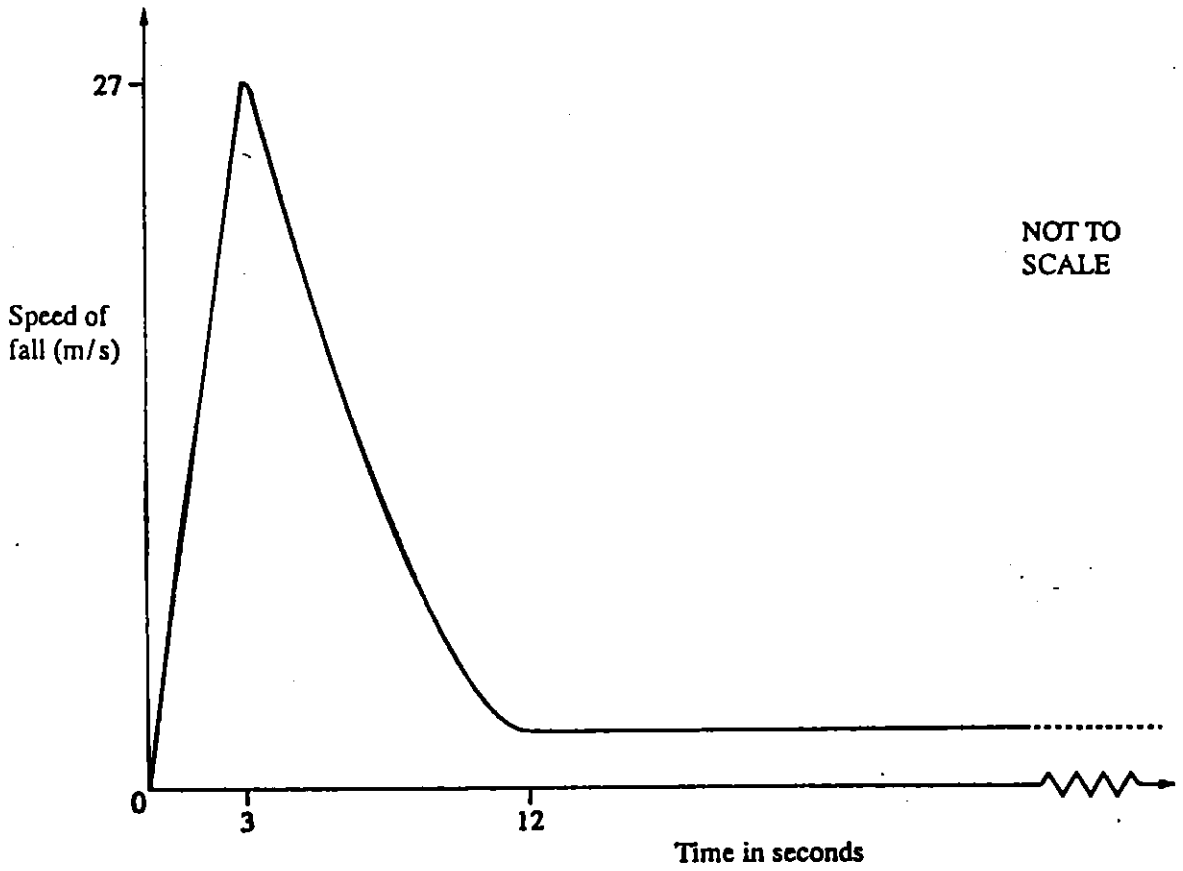
(b)



Pierre stands on level ground at the point *P*, 5 metres from *O*. Pierre is *x* metres tall and his shadow *PT* is 2*x* metres long. Find the value of *x*.

Answer (b) x = ... [2]

20



Simon jumps from a balloon. He falls faster and faster with constant acceleration until after 3 seconds he opens his parachute. His speed decreases for the next 9 seconds and then remains constant until he lands on the ground. The speed - time diagram above shows this.

(a) For the first 3 seconds, calculate

(i) his acceleration,

Answer (a)(i) .....m/s^2 [1]

(ii) the distance he falls.

Answer(a)(ii) .....m [1]

(b) The total distance Simon falls in the first 12 seconds is 112 m. His constant speed after that is 2 m/s. Calculate in minutes and seconds the total time for his jump if the balloon was 1000 metres above the ground.

Answer (b) ..... min..... s [2]

21 (a) Write $\frac{1}{x-3} - \frac{1}{x}$ as a single fraction in its simplest form.

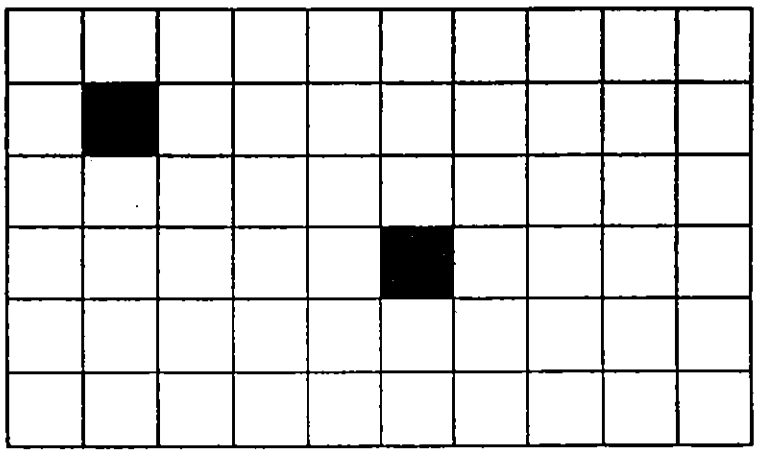
Answer (a) ..... [2]

(b) Use your answer to **part (a)** to make y the subject of the formula $\frac{1}{y} = \frac{1}{x-3} - \frac{1}{x}$.

Answer (b) ..... [2]

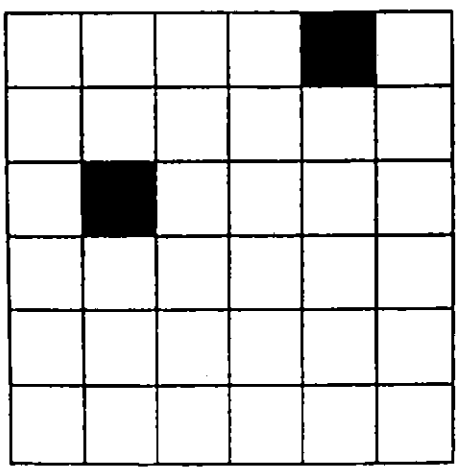
---

22 (a) Shade in the **minimum** number of squares so that this rectangular grid has 2 lines of symmetry.



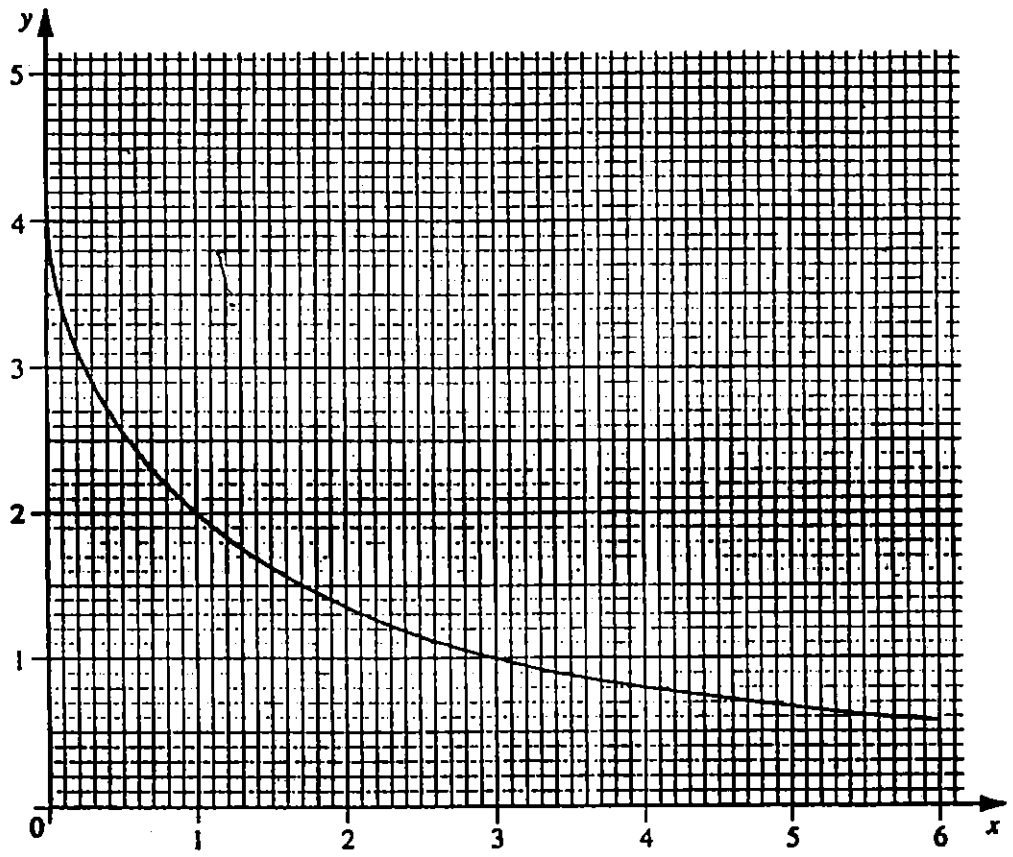
[2]

(b) Shade in the **minimum** number of squares so that this square grid has rotational symmetry of order 4.



[2]

23



The graph of $y = f(x)$ is shown above.

(a) Use the graph to find (i) f(2),

Answer (a)(i) f(2) = ... [1]

(ii) $f^{-1}(2)$.

Answer (a)(ii) $f^{-1}(2)$ = ... [1]

(b) Draw the tangent to the graph at $x = 1$. Use it to calculate an estimate of the gradient (slope) of the graph at this point.

Answer (b) gradient = ... [3]

290

Candidate Name _____ Centre Number | Candidate Number

International General Certificate of Secondary Education
UNIVERSITY OF CAMBRIDGE LOCAL EXAMINATIONS SYNDICATE

MATHEMATICS
PAPER 2

0580/2, 0581/2

Friday 3 NOVEMBER 2000 Morning 1 hour 30 minutes

Candidates answer on the question paper.
Additional materials:
Electronic calculator
Geometrical instruments
Mathematical tables (optional)
Tracing paper (optional)

TIME 1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces at the top of this page.
Answer all questions.
Write your answers in the spaces provided on the question paper.
If working is needed for any question it must be shown below that question.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 70.
Electronic calculators should be used.
If the degree of accuracy is not specified in the question, and if the answer is not exact, the answer should be given to three significant figures. Answers in degrees should be given to one decimal place.
For π, use either your calculator value or 3.142.

FOR EXAMINER'S USE

This question paper consists of 11 printed pages and 1 blank page.

[Turn over

1 Work out $7 - 5 \times (6 - 1)$.

Answer ..... [1]

---

2 Make h the subject of the formula $g = \sqrt{h + i}$.

Answer $h =$ ..... [2]

---

3 Find the value of $\left(\frac{9}{4}\right)^{-\frac{3}{2}}$, giving your answer as an exact fraction.

Answer ..... [2]

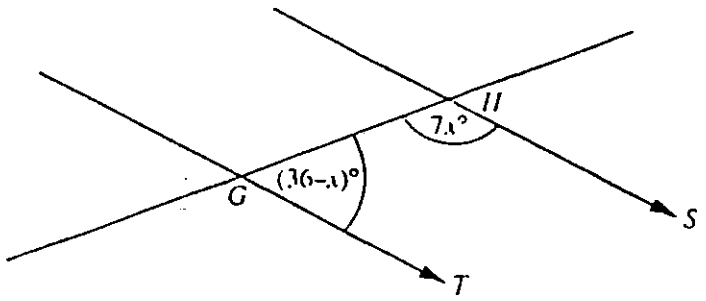
---

4 **Showing all your working**, calculate $1\frac{1}{4} \div \frac{3}{5} - 1\frac{1}{3}$.

Answer ..... [2]

5

NOT TO SCALE

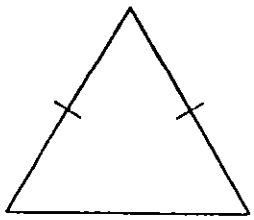


In the diagram GT is parallel to HS.
Angle $HGT = (36 - x)°$ and angle $GHS = 7x°$.
Find the value of x.

Answer $x =$ ..... [2]

6

NOT TO SCALE



The equal sides of the isosceles triangle are each 7.7 cm, correct to the nearest millimetre.
The perimeter is 21.7 cm, also correct to the nearest millimetre.
Calculate the smallest possible length of the third side of the triangle. Show your working.

Answer .....cm [2]

---

7 **Solve the simultaneous equations** $2x - y = 81$,
$x + 2y = 23$.

Answer $x =$ .....

$y =$ ..... [3]

---

8 Anne-Françoise took part in a charity walk.
She walked 43.4 km at an average speed of 2.8 km/h.

(a) For how long did she walk?

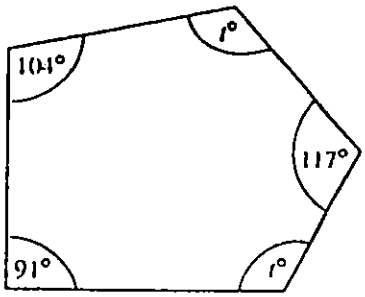
Answer (a) .....h [2]

(b) She started the walk at 2040. At what time on the next day did she finish the walk?

Answer (b) ..... [1]

9

NOT TO SCALE



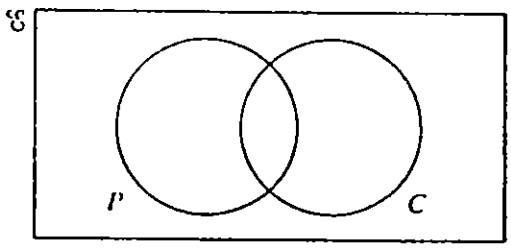
In the pentagon the two angles labelled $t°$ are equal.
Calculate the value of t.

Answer $t =$ ..... [3]

10 **Solve the inequality** $7 - 5x \geqslant -17$, **given that x is a positive integer.**

Answer $x \in \{$ ..... $\}$ [3]

11



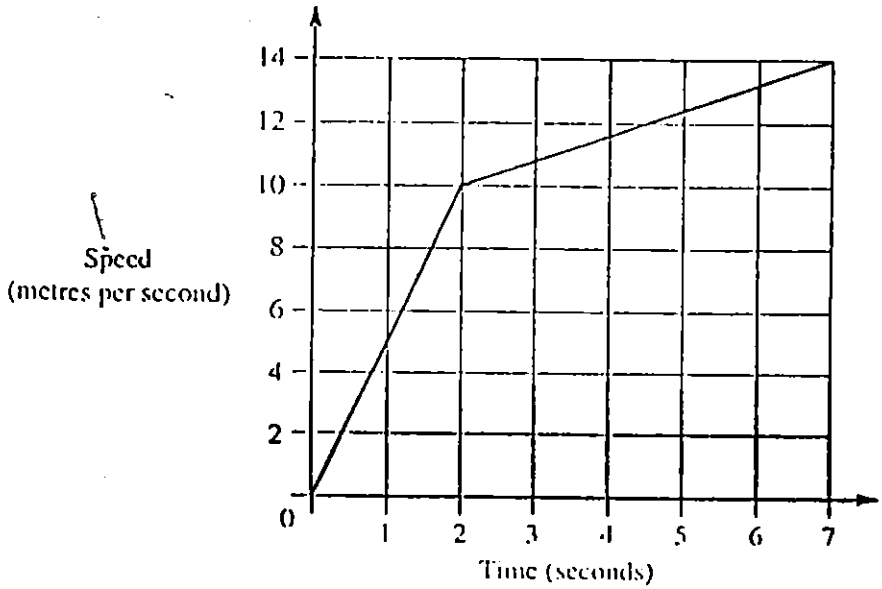
(a) There are 22 students in a class.
15 of these students study Physics (P) and 17 study Chemistry (C).
3 study neither Physics nor Chemistry.
By using the Venn diagram, or otherwise, find the number of students who study both Physics and Chemistry.

Answer (a) ..... [2]

(b) On the Venn diagram shade the region $P' \cap C$. [1]

For Examiner's Use

12



A car starts from rest. The speed-time graph shows the first 7 seconds of its journey.
Calculate

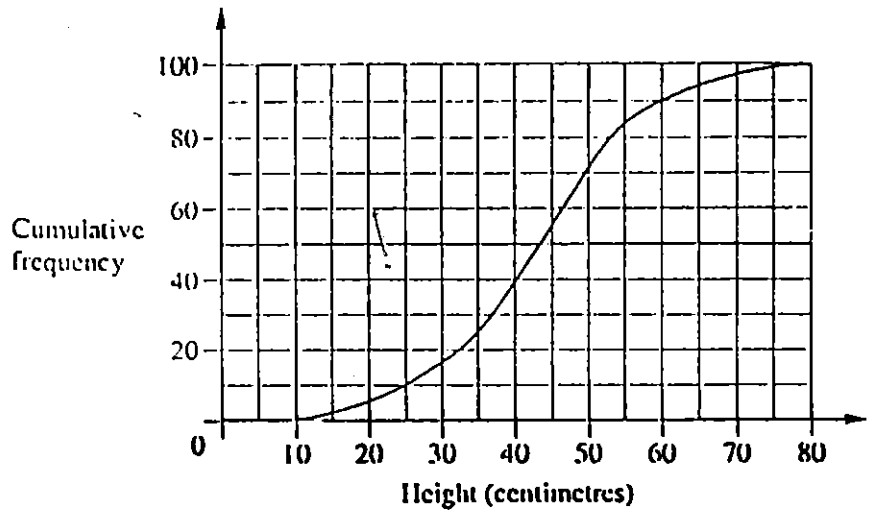
(a) the acceleration between 2 and 7 seconds,

Answer (a) .....m/s^2 [1]

(b) the distance travelled by the car during the first 7 seconds.

Answer (b) .....m [2]

13



The cumulative frequency diagram shows the height of plants measured in an experiment.
From the diagram, estimate

(a) (i) the lower quartile,

Answer (a)(i) .....cm [1]

(ii) the inter-quartile range.

Answer (a) (ii) .....cm [1]

(b) the number of plants with a height greater than 25 cm.

Answer (b) ..... [1]

---

14 For a holiday in 1998, Stefan wanted to change 250 Cypriot pounds (£) into Greek Drachma.
He first had to pay a bank charge of $1\frac{1}{2}\%$ of the £250.
He then changed the remaining pounds into Drachma at a rate of £1 = 485 Drachma.
Calculate how many Drachma Stefan received, giving your answer to the nearest 10.

Answer .....Drachma [3]

For Examiner's Use

15 (a) Factorise $t^2 - 4$.

Answer (a) ..... [1]

(b) Factorise completely $at^2 - 4a + 2t^2 - 8$.

Answer (b) ..... [2]

16

NOT TO SCALE

A set of Russian dolls is made so that the volume, V, of each of them varies directly as the cube of its height, h.
The doll with a height of 3 cm has a volume of 6.75 cm^3.

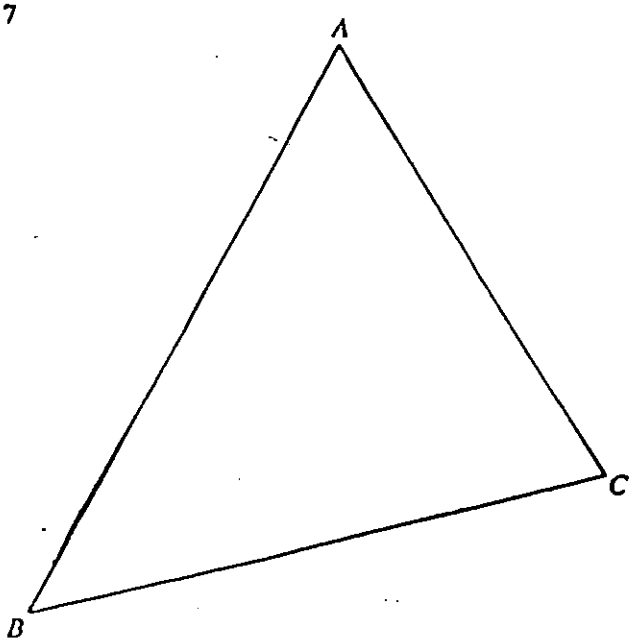
(a) Find an equation for V in terms of h.

Answer (a) $V =$ ..... [2]

(b) Find the volume of a doll with a height of 2.5 cm.

Answer (b) ..... cm^3 [1]

17



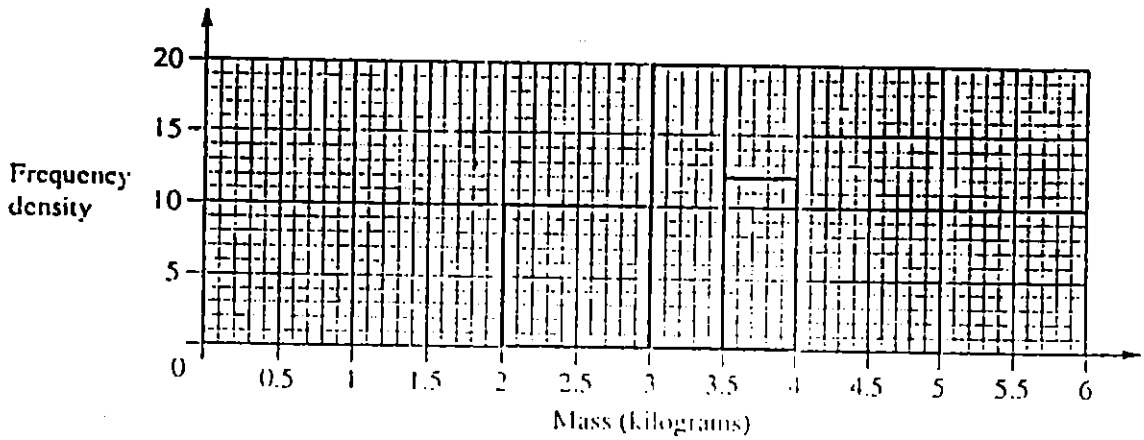
(a) Draw accurately the locus of points inside the triangle

(i) 6 cm from B. [1]

(ii) equidistant from AC and BC. [1]

(b) Shade the region inside the triangle which is more than 6 cm from B and nearer to BC than to AC. [1]

18



The mass of each baby born in a hospital during one week is recorded.
The results for babies whose mass is between 2 kg and 4 kg are shown in the histogram.

(a) Complete the frequency table below.

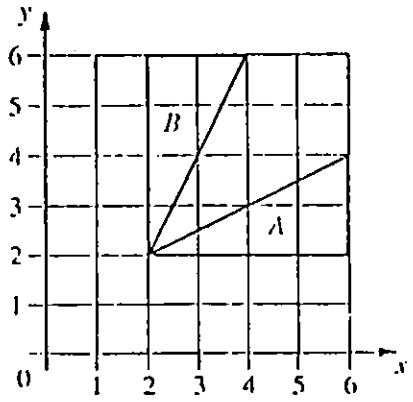
Mass (m) in kilograms	Frequency
$2 < m \leqslant 3$	10
$3 < m \leqslant 3.5$	
$3.5 < m \leqslant 4$	

[2]

(b) 8 babies were born with a mass m kilograms such that $4 < m \leqslant 6$.
Complete the histogram above to show this information. [1]

For Examiner's Use

19



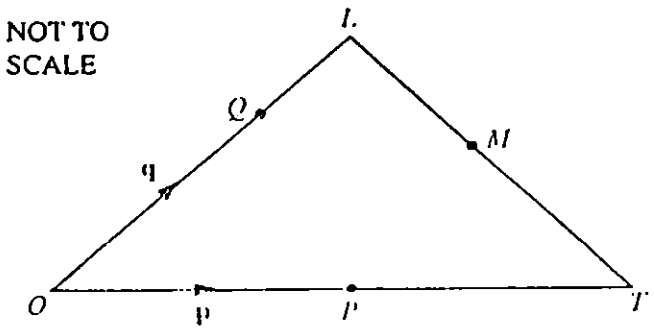
(a) Describe fully the single transformation which maps triangle *A* onto triangle *B*.

Answer (a) ..... [2]

(b) Find the 2×2 matrix which represents this transformation.

Answer (b) [2]

20



The position vectors $\overrightarrow{OP}$ and $\overrightarrow{OQ}$ are p and q.
OP is extended to T so that $OP = PT$.
OQ is extended to L so that $OQ : QL = 2:1$.

(a) Find, in terms of p and/or q.

(i) $\overrightarrow{OL}$.

Answer (a)(i) $\overrightarrow{OL}$ = ... [1]

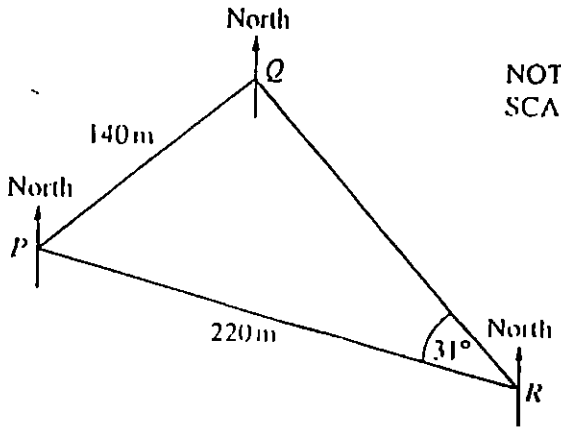
(ii) $\overrightarrow{LT}$.

Answer (a)(ii) $\overrightarrow{LT}$ = ... [1]

(b) M is the mid-point of LT.
Find $\overrightarrow{OM}$ in terms of p and q.
Give your answer in its simplest form.

Answer (b) $\overrightarrow{OM}$ = ... [2]

21



Theresa swims from P to Q, then from Q to R and then finally returns from R to P. $PQ = 140$ m, $RP = 220$ m and angle $PRQ = 31°$.

(a) Angle PQR is obtuse.
Calculate its size, to the nearest degree.

Answer (a) ..... **[4]**

(b) **The bearing of Q from P is 060°.**
Calculate the bearing of R from Q.

Answer (b) ..... **[1]**

---

22 $f: x \mapsto 3 - 2x$ and $g: x \mapsto \frac{x+1}{4}$, for all values of x.

(a) Find $f(-\frac{3}{4})$.

Answer (a) ..... [1]

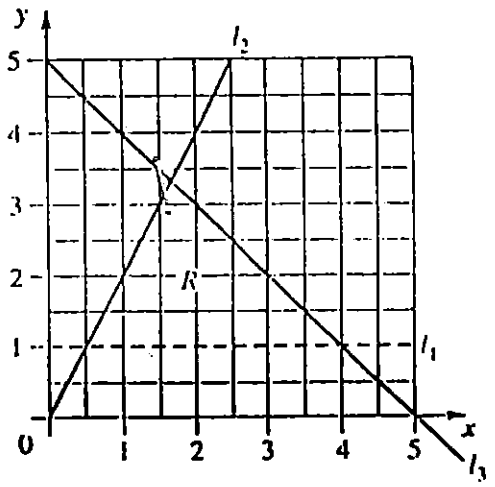
(b) Find the inverse function, $g^{-1}(x)$.

Answer (b) $g^{-1}(x) =$ ..... [2]

(c) Find the composite function, $fg(x)$, giving your answer as a single fraction.

Answer (c) $fg(x) =$ ..... [2]

23



(a) Find the equations of the lines l_1, l_2 and l_3.

Answer (a) l_1: .....

l_2: .....

l_3: ..... [3]

(b) The unshaded region, labelled R, is defined by three inequalities.
Write down these three inequalities.

Answer (b) .....

.....

.....[2]

Centre Number	Candidate Number

Candidate Name _____

International General Certificate of Secondary Education
UNIVERSITY OF CAMBRIDGE LOCAL EXAMINATIONS SYNDICATE

MATHEMATICS 0580/2, 0581/2

PAPER 2

MAY/JUNE SESSION 2001 1 hour 30 minutes

Candidates answer on the question paper.
Additional materials:
Electronic calculator
Geometrical instruments
Mathematical tables (optional)
Tracing paper (optional)

TIME 1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES

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For π, use either your calculator value or 3.142.

FOR EXAMINER'S USE

This question paper consists of 12 printed pages.

1 Work out $\dfrac{7.7}{3 + \sqrt{6.25}}$.

Answer ..... [1]

2 A map has a scale of 1 : 250000. Complete the statement below.

1 centimetre on the map represents ..... kilometres on the ground. [1]

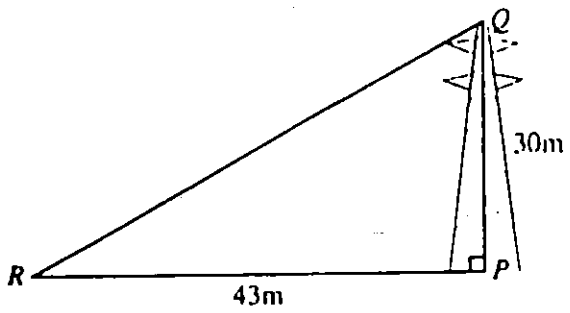
3 **(a) One gigabyte is 1 000 000 000 bytes. A computer has a 12.6 gigabyte hard disk. Write 12.6 gigabytes in bytes, giving your answer in standard form.**

Answer (a) .....bytes [1]

(b) A picosecond is 10^{-12} seconds. A computer takes 150 picoseconds to complete a task. Write 150 picoseconds in seconds, giving your answer in standard form.

Answer (b).....s [1]

4

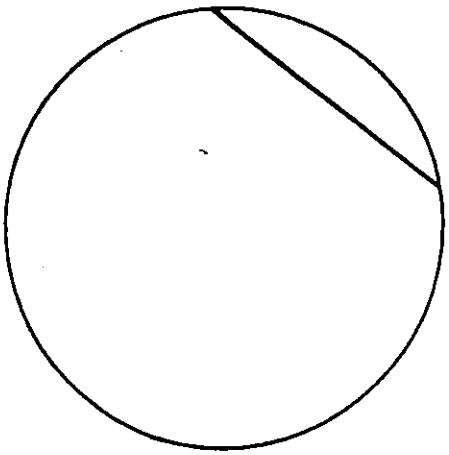


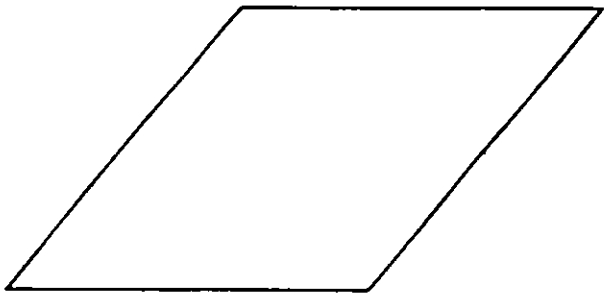
NOT TO SCALE

A pylon PQ is 30 metres high and it stands on level ground.
Its base P is 43 metres from a point R.
Find the angle of elevation of the top of the pylon from R.

Answer ..... [2]

5





Draw any lines of symmetry on each of the diagrams above. [2]

6 Solve the inequality $25 - 3x < 7$.

Answer ..... [2]

7 Juan and Pedro each make similar models of the same aeroplane.
Juan uses a scale of 1 : 50.
Pedro uses a scale of 1 : 100.
Find the ratio of the volumes of Juan's model : Pedro's model.

Answer ..... : ..... [2]

8 It takes Nina 2 hours 30 minutes to fill a swimming pool using 2 hosepipes.
How long will it take Nina to fill the pool if she uses 3 hosepipes?
[You may assume all the hosepipes supply water at the same rate.]

Answer ..... h..... min [2]

---

9 (a) Maria paid $1320 tax in 1999. She paid 10% less tax in 2000.
Calculate the tax Maria paid in 2000.

Answer (a) $ ..... [1]

(b) $1320 was 10% more than she paid in 1998.
Calculate the tax Maria paid in 1998.

Answer (b) $ ..... [2]

---

10 Solve the simultaneous equations $3x + 4y = 27$,
$4x - 2y = 25$.

Answer x = ...

y = ... [3]

For Examiner's Use

11 The capacity of a jug is 3.5 litres correct to the nearest 0.1 litre.
The capacity of a glass is 0.25 litres correct to the nearest 0.01 litre.

(a) Complete the following statements.

(i) The minimum capacity of the jug is ..... litres. [1]

(ii) The maximum capacity of the glass is ..... litres. [1]

(b) Calculate the greatest number of glasses which you can be sure to fill from a full jug.

Answer (b) ..... [1]

12

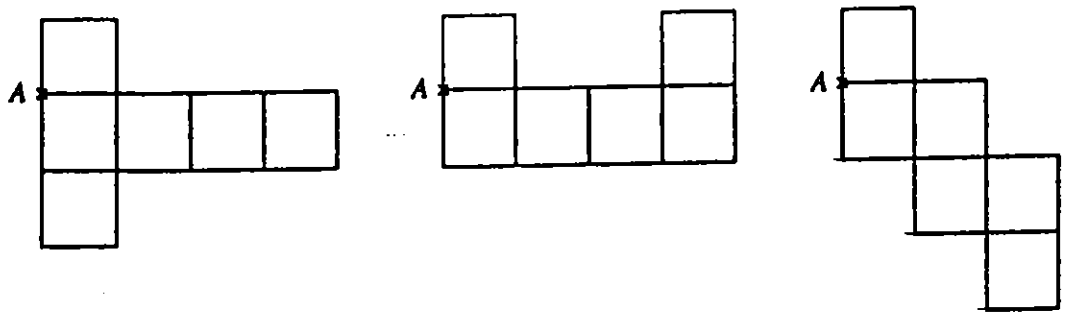


Diagram 1 Diagram 2 Diagram 3

(a) One of the three diagrams above is not the net of a cube. Which diagram is it?

Answer (a) Diagram ..... [1]

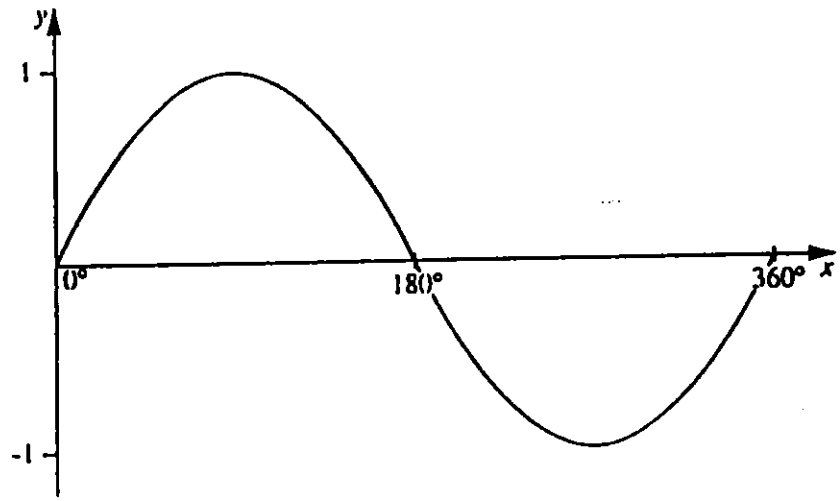
(b) On each of the other two diagrams, mark and label A' the point which will touch the point A when the net is folded to make a cube. [2]

For Examiner's Use

13 Make y the subject of the formula $x = \dfrac{4 + \sqrt{y}}{3}$.

Answer $y =$ ..... [3]

14



The sketch graph shows $y = \sin x$ for $0° \leqslant x \leqslant 360°$.

(a) Find the obtuse angle x for which $\sin x = \sin 50°$.

Answer (a) $x =$ ..... [1]

(b) Find the two values of x for which $\sin x = -\sin 50°$ and $0° \leqslant x \leqslant 360°$.

Answer (b) $x =$ ..... or $x =$ ..... [2]

15 Simplify $\frac{4x-3}{8} - \frac{3x-4}{12}$.

Answer ..... [3]

---

16 A cycle race began at 09 40.
Henri finished at 11 16 exactly and his average speed was 30 kilometres per hour.

(a) Calculate the length of the race in kilometres.

Answer (a) .....km [2]

(b) The winning time was 1 hour 25 minutes 27 seconds.
How many minutes and seconds was Henri behind the winner?

Answer (b) ..... min .....s [1]

---

17 The interior angle of a regular n-sided polygon is 48° more than the interior angle of a regular hexagon.

(a) Find the size of the interior angle of the n-sided polygon.

Answer (a) ..... [2]

(b) Find the value of n.

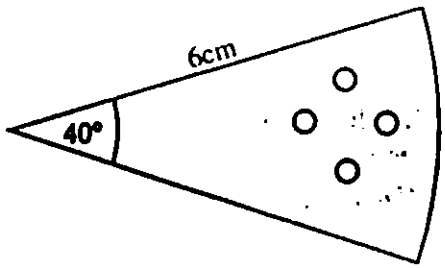
Answer (b) n = ... [2]

---

18 (a) Calculate the area of a sector of a circle which has an angle of 40° and a radius of 6 cm.

Answer (a) .....cm^2 [2]

(b) A brooch is in the shape of a sector of a circle with 4 small identical circular holes.



NOT TO SCALE

The radius of each hole is 0.3 cm.
Calculate

(i) the area of one hole,

Answer (b)(i) .....cm^2 [1]

(ii) the area of the brooch, which is shaded in the diagram above.

Answer (b)(ii) .....cm^2 [1]

---

19 (a) (i) Expand $(x^2 - 1)(x^2 + 1)$.

Answer (a)(i) ..... [1]

(ii) Factorise $x^2 - 1$.

Answer (a)(ii) ..... [1]

(b) $9999 = 10^4 - 1$. Write 9999 as a product of prime factors.

Answer (b) 9999 = ... [2]

---

20 $f(x) = \frac{x+1}{3x}$ for $x > 0$, $g(x) = 3 - 3x$ for any value of x.

(a) Find

(i) $f\left(\frac{3}{4}\right)$, giving your answer as a fraction,

Answer (a)(i) ..... [1]

(ii) $g\left[f\left(\frac{3}{4}\right)\right]$, giving your answer as a fraction.

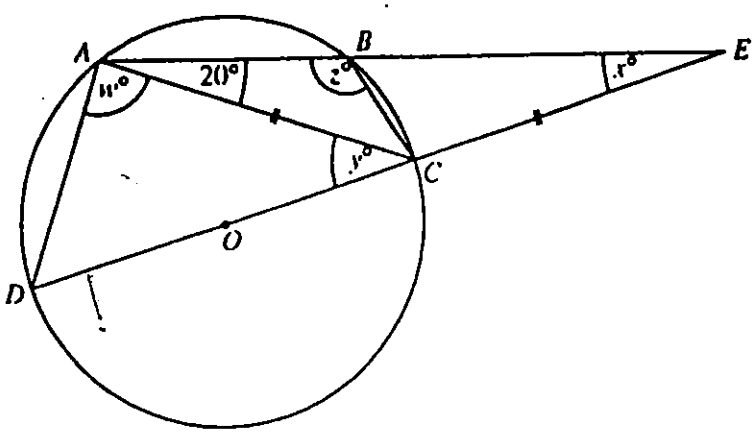
Answer (a)(ii) ..... [1]

(b) Find $g^{-1}(18)$.

Answer (b) ..... [2]

For Examiner's Use

21



NOT TO SCALE

The centre of the circle *ABCD* is *O*.
***ABE* and *DOCE* are straight lines.**
***AC* = *CE* and angle *BAC* = 20°.**
Find the values of w, x, y and z.

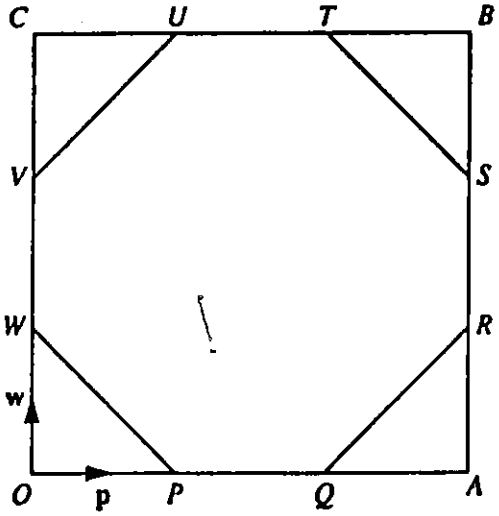
Answer w = ... [1]

x = ... [1]

y = ... [1]

z = ... [1]

22



Each side of the square *OABC* is divided into 3 equal parts to form the octagon *PQRSTUVW*.

$\overrightarrow{OP}$ = p and $\overrightarrow{OW}$ = w.

(a) Find the following vectors in terms of p and w. Write your answers in their simplest form.

(i) $\overrightarrow{WP}$.

Answer (a)(i) $\overrightarrow{WP}$ = ... [1]

(ii) $\overrightarrow{OB}$.

Answer (a)(ii) $\overrightarrow{OB}$ = ... [1]

(iii) $\overrightarrow{RV}$.

Answer (a)(iii) $\overrightarrow{RV}$ = ... [1]

(b) Find $|\overrightarrow{OB}|$ when |p| = |w| = 5.

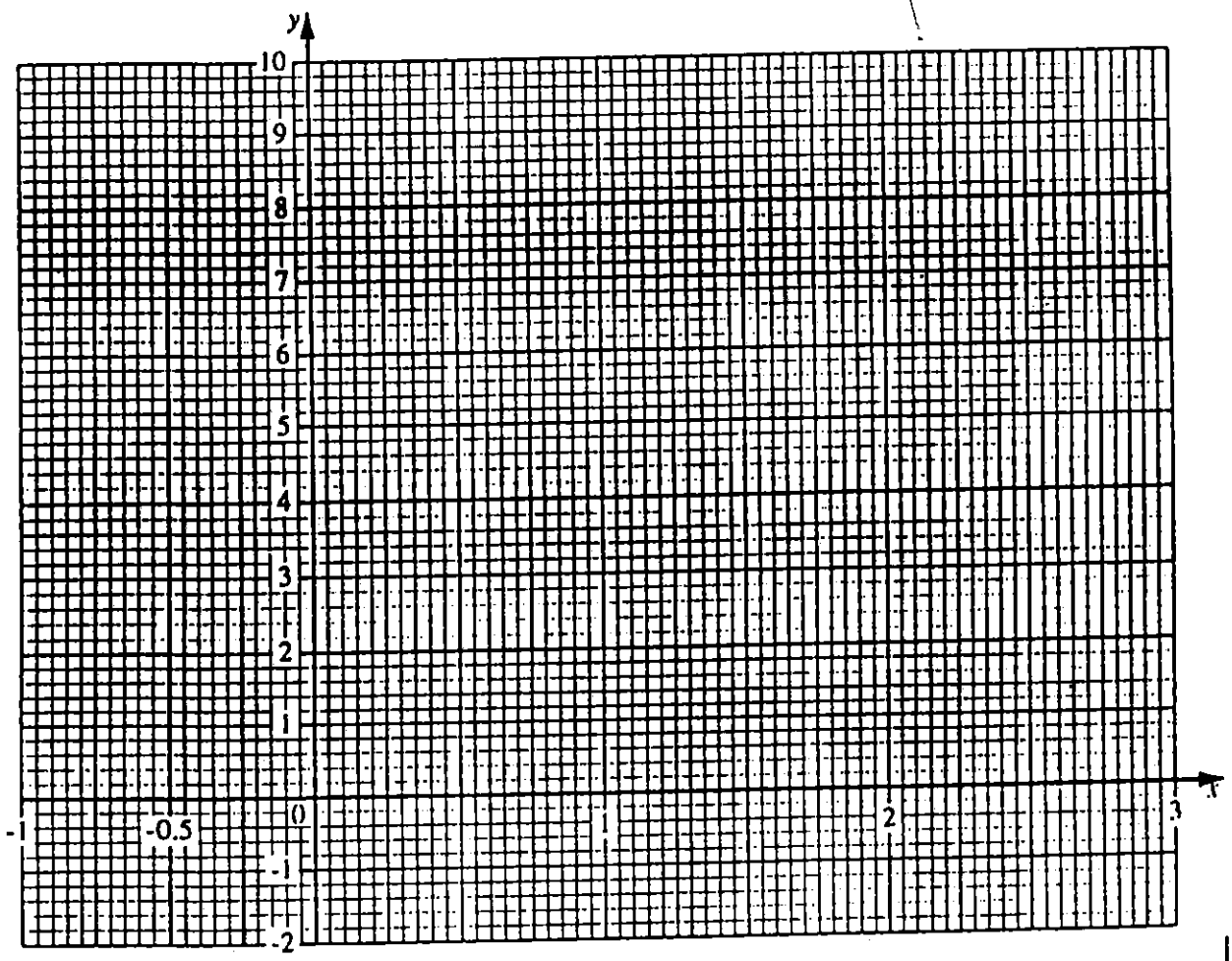
Answer (b) $|\overrightarrow{OB}|$ = ... [2]

23 $f(x) = 2^x$.

(a) Fill in the values of $f(x) = 2^x$ in the table below.

x	−1	−0.5	0	1	2	3
$f(x)$						

[2]



(b) Draw the graph of $y = f(x)$ for $-1 \leqslant x \leqslant 3$ on the grid above. [2]

(c) Use your graph to find the value of x when

(i) $2^x = 3$,

Answer (c)(i) $x =$ ..... [1]

(ii) $2^x = -x$.

Answer (c)(ii) $x =$ ..... [2]

Centre Number | Candidate Number

Candidate Name _____

International General Certificate of Secondary Education
UNIVERSITY OF CAMBRIDGE LOCAL EXAMINATIONS SYNDICATE

MATHEMATICS 0580/2, 0581/2

PAPER 2

OCTOBER/NOVEMBER SESSION 2001 1 hour 30 minutes

Candidates answer on the question paper.
Additional materials:
Electronic calculator
Geometrical instruments
Mathematical tables (optional)
Tracing paper (optional)

TIME 1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES

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For π, use either your calculator value or 3.142.

FOR EXAMINER'S USE

This question paper consists of 11 printed pages and 1 blank page.

1 Work out $3.2 \times 5 - 2(4.1 - 2.9)$.

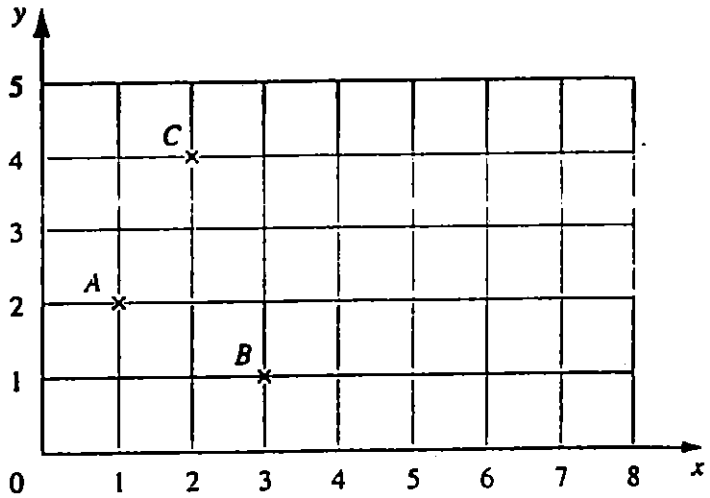
Answer ..... [1]

---

2 On December 21st at Cabo de Hornos the sun rises at 04 39.
The sun sets 17 hours 36 minutes later.
Write down the time when the sun sets.

Answer ..... [1]

3



The points A, B and C are marked on the grid above.

(a) $\overrightarrow{CD} = 2\overrightarrow{AB}$. Mark and label the point D on the diagram. [1]

(b) Write $\overrightarrow{CA}$ as a vector.

Answer (b) $\overrightarrow{CA} = \begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [1]

---

4 (a) Yellow light has a frequency of 5.17×10^{14} hertz.
Green light has a frequency of 5.66×10^{14} hertz.
Work out the difference between these two frequencies.
Give your answer in standard form.

Answer (a) ..... hertz [1]

(b) One nanometre is 10^{-9} metres. Green light has a wavelength of 530 nanometres.
Write this wavelength in metres, in standard form.

Answer (b) ..... m [1]

---

5 The running time of a video is 4 hours with a possible error of 1%.
Find in hours, minutes and seconds the least possible running time of the video.

Answer .....h.....min.....s [2]

6 Elena invests $\$P$ for 9 months at 4% simple interest per year. She receives $39 interest.
Calculate the value of P.

Answer P = ... [2]

7 Amit and Sandeep estimate the mass of a car.
Amit says 0.75 tonnes and Sandeep says 60 000 grams.
The actual mass of the car is 650 kilograms.
Calculate, in kilograms, the error in each estimate.

Answer Amit's error .....kg [1]

Sandeep's error .....kg [1]

8 In computing terms, a 'kilobyte' is 2^{10} bytes and each byte is 8 bits.

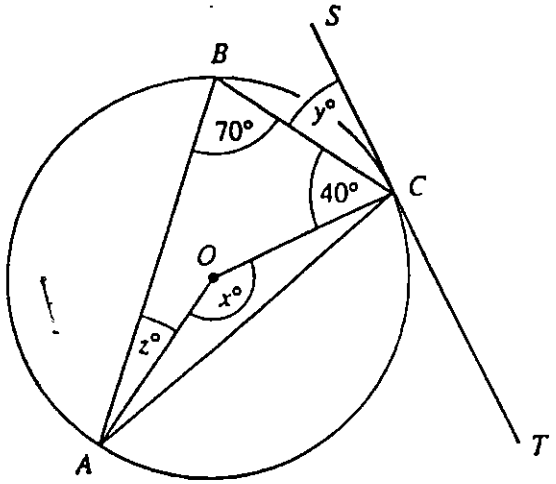
(a) 1 kilobyte is 2^x bits. Find x.

Answer (a) x = ... [1]

(b) 4 kilobytes is 2^y bits. Find y.

Answer (b) y = ... [1]

9



NOT TO SCALE

Circle *ABC* has centre *O*. The line *SCT* is a tangent.
Angle *ABC* = 70° and angle *OCB* = 40°.
Find *x*, *y* and *z*.

Answer $x =$ ..... [1]

$y =$ ..... [1]

$z =$ ..... [1]

---

10 (a) Factorise completely $6x^2 + 6x$.

Answer (a)..... [1]

(b) Factorise $6x^2 + 5x + 1$.

Answer (b) ..... [2]

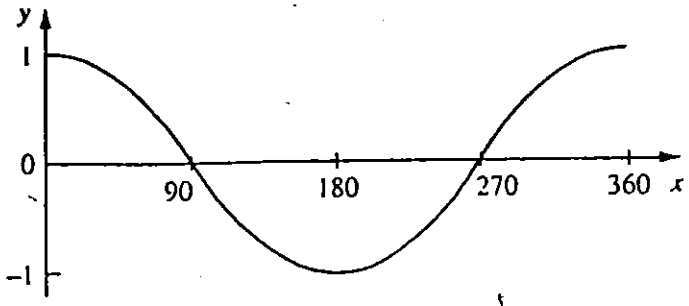
---

11 A pentagon has angles of $2x°$, $3x°$, $4x°$, $5x°$ and $6x°$.
Calculate the size of its smallest angle.

Answer ..... [3]

---

12 (a)



NOT TO SCALE

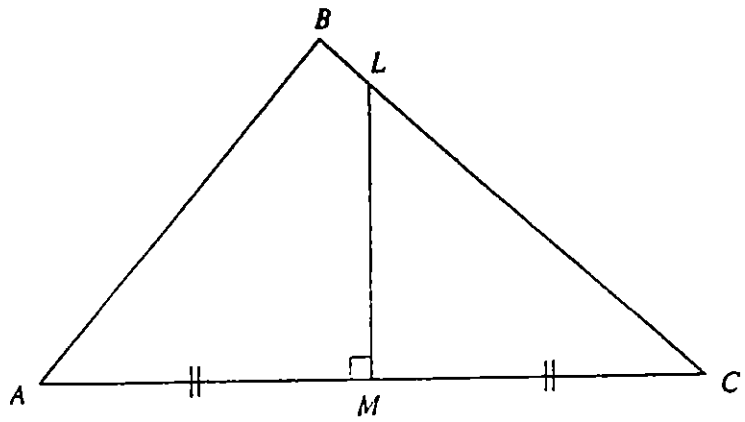
The diagram shows a sketch of $y = \cos x°$.
For $0 \leqslant x \leqslant 360$, find two values of x for which $\cos x° = \frac{1}{2}$.

Answer (a) $x =$ ..... or ..... [1]

(b) Find the range of values of x for which $0 < \cos x° < \frac{1}{2}$ and $90 \leqslant x \leqslant 360$.

Answer (b) .....$< x <$ ..... [2]

13



In triangle ABC, the line LM is the perpendicular bisector of AC.

(a) Draw, using a straight edge and compasses only, the bisector of angle BAC. [1]

(b) Shade the region in triangle ABC which is less than 5 cm from A, nearer to AC than AB and nearer to C than A. [2]

---

14 In an electrical circuit the current, I amperes, is directly proportional to the square root of the power, P watts.
$I = 4$ when $P = 100$.

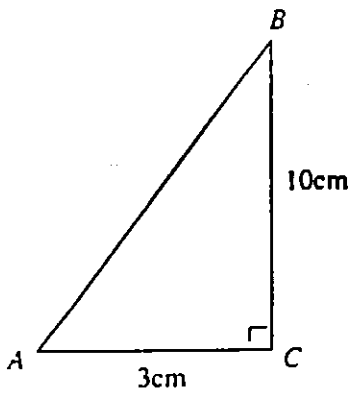
(a) Find an equation connecting I and P.

Answer (a)..... [2]

(b) Calculate I when $P = 144$.

Answer (b) $I =$ ..... [1]

15



NOT TO SCALE

In triangle ABC, angle $ACB = 90°$ exactly but the lengths $AC = 3$ cm and $BC = 10$ cm are only correct to the nearest centimetre.

(a) Write down the smallest possible value of AC.

Answer (a).....cm [1]

(b) Calculate, correct to 1 decimal place, the largest possible size of angle BAC.

Answer (b) ..... [2]

16 Sofia changes x pesetas into rands when the exchange rate is 1 rand = 24 pesetas.

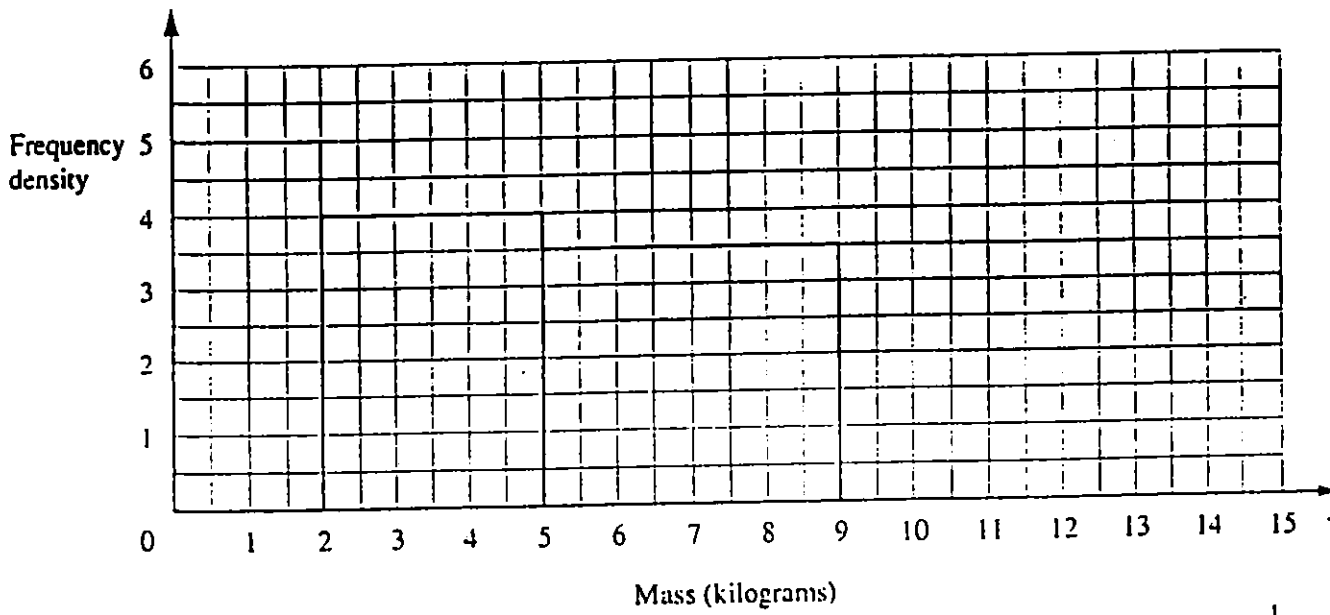
(a) Write down the number of rands Sofia receives, in terms of x.

Answer (a).....rands [1]

(b) After she spends 500 rands, Sofia has 800 rands left.
Find the value of x.

Answer (b) x = ... [2]

17



Mass (x kg)	$0 < x \leq 2$	$2 < x \leq 5$	$5 < x \leq 9$	$9 < x \leq 15$
Frequency	10			12

The mass, x kilograms, of each small child in a hospital was recorded.

(a) Use the histogram to help you fill in the two missing frequencies in the table. [2]

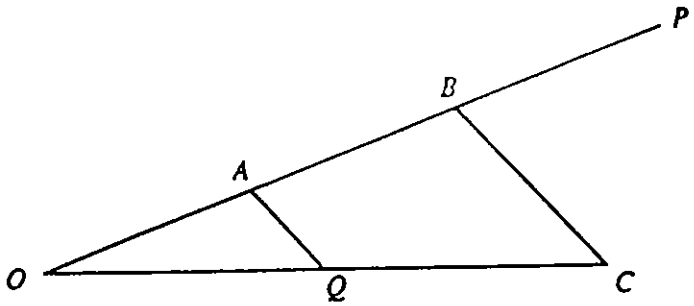
(b) Draw the rectangle for the $9 < x \leq 15$ group on the histogram. [1]

18 Make x the subject of the formula

$$y = \frac{3x}{2} + 5.$$

Answer $x =$ ..... [3]

19



NOT TO SCALE

Q is the midpoint of OC and $OABP$ is a straight line with $OA = AB = BP$.
$\overrightarrow{OP} = 6\mathbf{p}$ and $\overrightarrow{OQ} = \mathbf{q}$.
Find in terms of p and/or q.

(a) $\overrightarrow{OB}$.

Answer (a) $\overrightarrow{OB} =$ ..... [1]

(b) $\overrightarrow{BC}$.

Answer (b) $\overrightarrow{BC} =$ ..... [1]

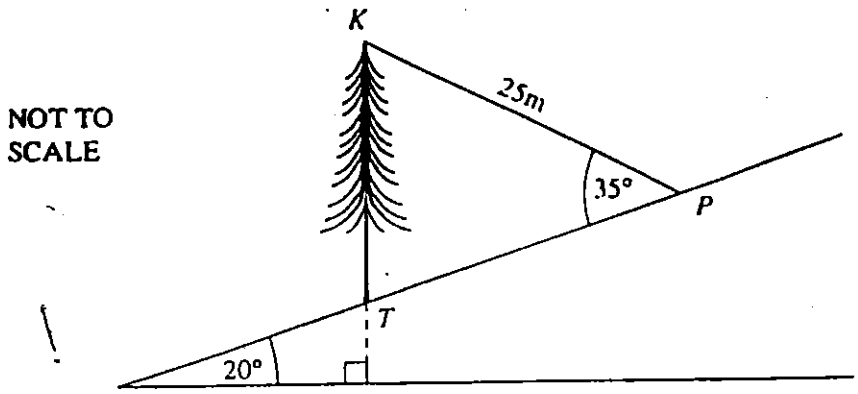
(c) $\overrightarrow{AQ}$.

Answer (c) $\overrightarrow{AQ} =$ ..... [1]

(d) Use your answers to parts (b) and (c) to explain why AQ is parallel to BC.

Answer (d) ..... [1]

20



NOT TO SCALE

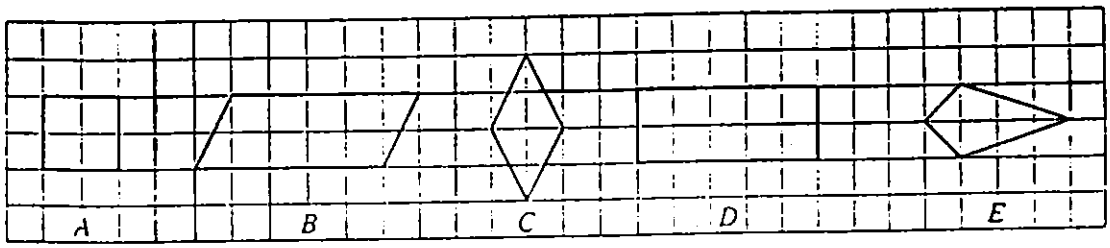
A tree, TK, grows vertically on a hillside which slopes at 20° to the horizontal.
A kite, K, on the end of a 25 metre string, KP, sticks in the top of the tree.
Angle KPT is 35°.
Calculate
(a) angle KTP,

Answer (a) **Angle KTP =** ..... **[1]**

(b) the height of the tree, KT.

Answer (b) KT = ... m **[3]**

21



Five different types of quadrilateral labelled A, B, C, D and E, are shown in the diagram above.

(a) One of the five is chosen at random.
What is the probability that its diagonals bisect each other?

Answer (a)..... **[1]**

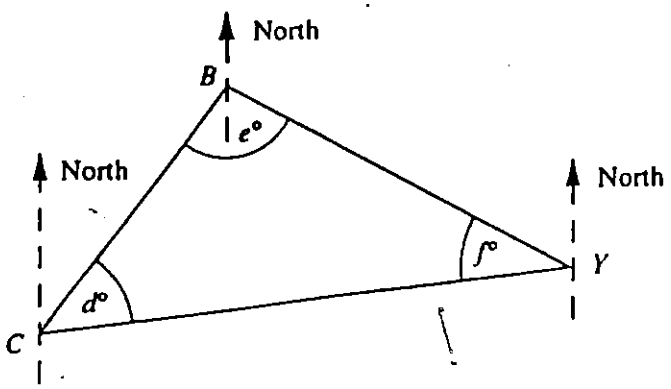
(b) Write down which of A, B, C, D and E have diagonals **intersecting** at 90°.

Answer (b)..... **[1]**

(c) Write down the special name of each quadrilateral shown in the diagram which has rotational symmetry of order 2.

Answer (c)..... **[2]**

22



NOT TO SCALE

A coastguard C sees a boat B on a bearing of 030° and a yacht Y on a bearing of 072°.
The bearing of the yacht from the boat is 136°.

(a) Calculate the values of d, e and f, the three angles of triangle CBY.

Answer (a) d = ...

e = ...

f = ... [3]

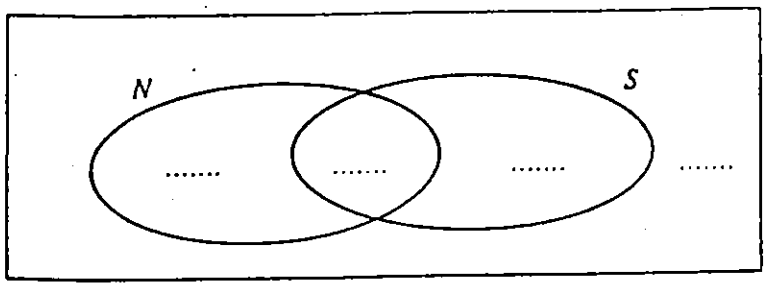
(b) What is the bearing of the coastguard from the yacht?

Answer (b)..... [1]

---

23 One of 36 tourists on holiday in Namibia and South Africa is chosen at random.
The probability that he has been to South Africa before is $\frac{1}{2}$.
The probability that he has been to Namibia before is $\frac{1}{9}$.
The probability that he has been to neither country before is $\frac{1}{3}$.

(a)

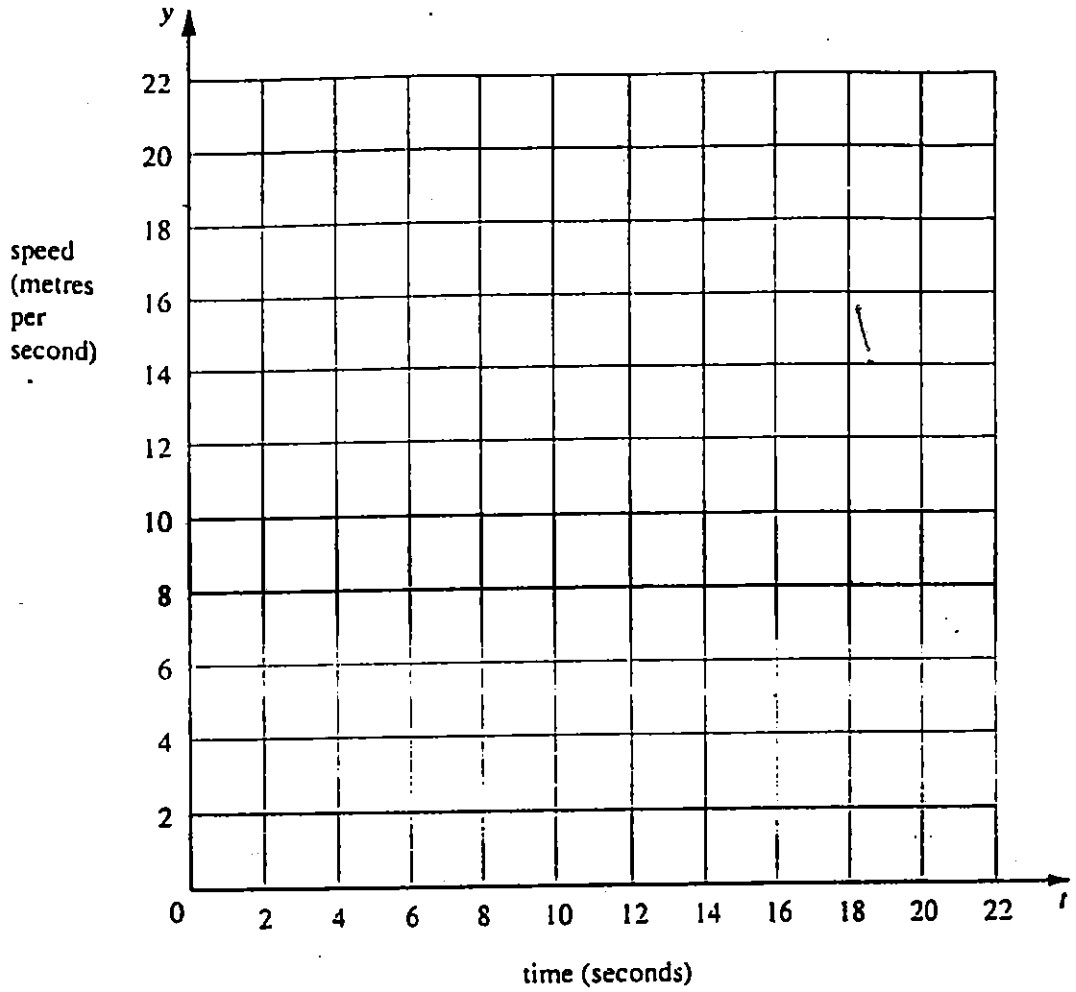


The set N represents those who have been to Namibia before.
The set S represents those who have been to South Africa before.
Calculate and fill in the number of tourists in each part of the Venn diagram above. [4]

(b) Write down the probability that one of the tourists, chosen at random, has been to both countries before.

Answer (b)..... [1]

24



A car starts from rest with a constant acceleration of 5 m/s^2 for 4 seconds.
Next it decelerates at 2 m/s^2 for 6 seconds.
Then it decelerates at d m/s^2 until it comes to rest again 18 seconds from the start.

(a) Draw the speed-time graph for the car on the grid above. [3]

(b) Find the value of d.

Answer (b) d = ... [1]

(c) Calculate the distance which the car travels while it is accelerating.

Answer (c)..... m [1]

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Candidate Name _____ Centre Number | Candidate Number

International General Certificate of Secondary Education
CAMBRIDGE INTERNATIONAL EXAMINATIONS

MATHEMATICS 0580/2, 0581/2
PAPER 2

MAY/JUNE SESSION 2002
1 hour 30 minutes

Candidates answer on the question paper.
Additional materials:
Electronic calculator
Geometrical instruments
Mathematical tables (optional)
Tracing paper (optional)

TIME 1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces at the top of this page.
Answer all questions.
Write your answers in the spaces provided on the question paper.
If working is needed for any question it must be shown below that question.

INFORMATION FOR CANDIDATES

The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 70.
Electronic calculators should be used.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142.

FOR EXAMINER'S USE

This question paper consists of 11 printed pages and 1 blank page.

UNIVERSITY of CAMBRIDGE
Local Examinations Syndicate

[Turn over

For Examiner's Use

1 Javed says that his eyes will blink 415 000 000 times in 79 years.

(a) Write 415 000 000 in standard form.

Answer (a) ..... [1]

(b) One year is approximately 526 000 minutes.
Calculate, correct to the nearest whole number, the average number of times his eyes will blink per minute.

Answer (b) ..... [1]

2 Luis and Hans both have their birthdays on January 1st.
In 2002 Luis is 13 and Hans is 17 years old.

(a) Which is the next year after 2002 when both their ages will be prime numbers?

Answer (a) ..... [1]

(b) In which year was Hans twice as old as Luis?

Answer (b) ..... [1]

3

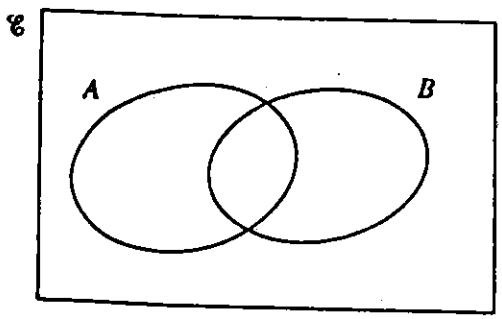


Diagram 1

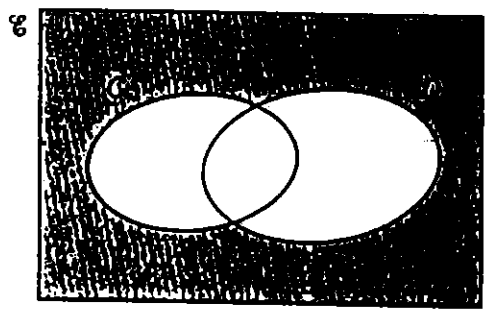


Diagram 2

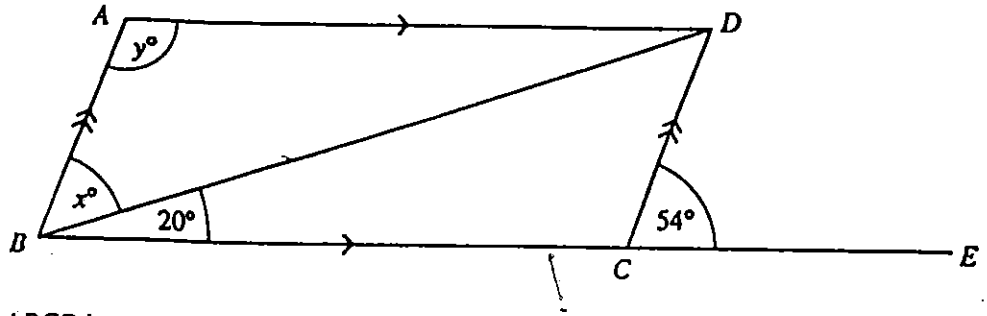
(a) In Diagram 1, shade the area which represents $A \cup B'$. [1]

(b) Describe in set notation the shaded area in Diagram 2.

Answer (b) ..... [1]

For Examiner's Use

4



NOT TO SCALE

$ABCD$ is a parallelogram and BCE is a straight line. Angle $DCE = 54°$ and angle $DBC = 20°$.

Find x and y.

Answer x = ...

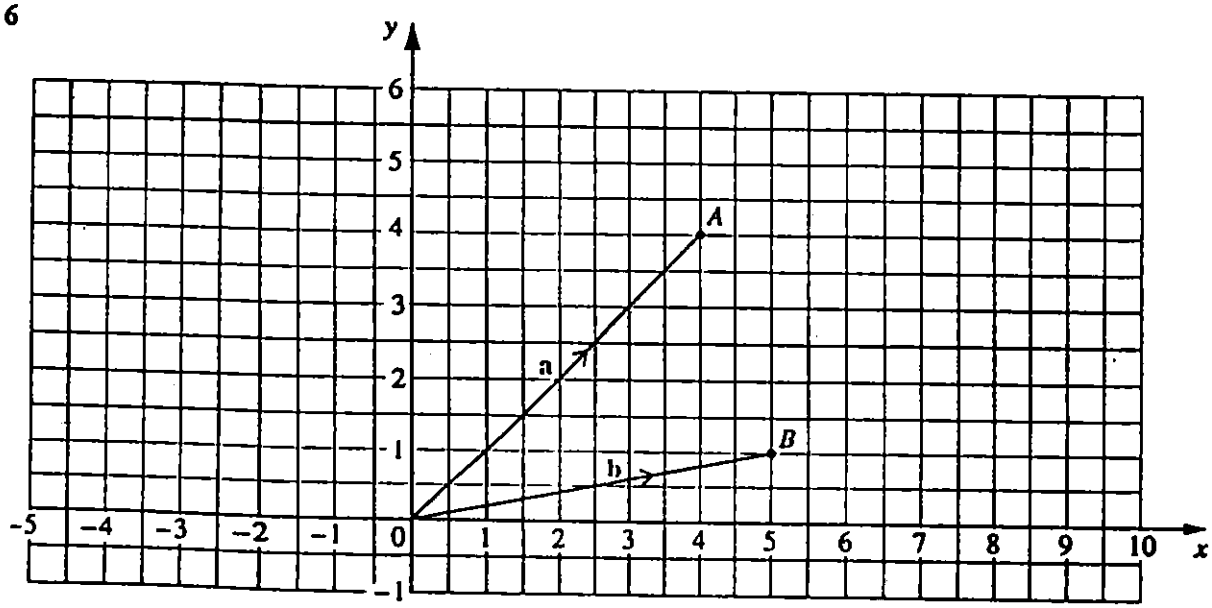
y = ... [2]

---

5 Calculate the length of the straight line joining the points (– 1, 4) and (5, –4).

Answer ..... [2]

6



(a) Draw the vector $\overrightarrow{OC}$ so that $\overrightarrow{OC} = a - b$. [1]

(b) Write the vector $\overrightarrow{AB}$ in terms of a and b.

Answer (b) $\overrightarrow{AB}$ ..... [1]

For Examiner's Use

7 The temperature decreases from 25 °C to 22 °C.
Calculate the percentage decrease.

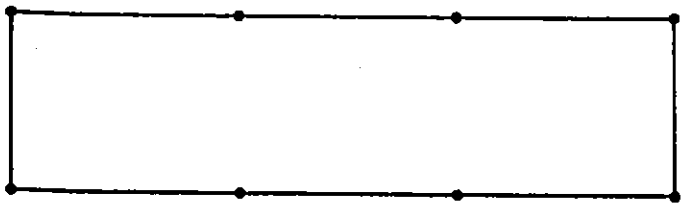
Answer ..... % [2]

8 Solve the inequality

$$3(x+7) < 5x - 9.$$

Answer ..... [2]

9 Elena has eight rods each of length 10 cm, correct to the nearest centimetre.
She places them in the shape of a rectangle, three rods long and one rod wide.



NOT TO SCALE

(a) Write down the minimum length of her rectangle.

Answer (a) ..... cm [1]

(b) Calculate the minimum area of her rectangle.

Answer (b) ..... cm^2 [1]

10 Mona made a model of a building using a scale of 1:20.
The roof of the building had an area of 300 m^2.

(a) Calculate the area of the roof of the model in square metres.

Answer (a) ..... m^2 [2]

(b) Write your answer in square centimetres.

Answer (b) ..... cm^2 [1]

11 Make V the subject of the formula $T = \frac{5}{V+1}$.

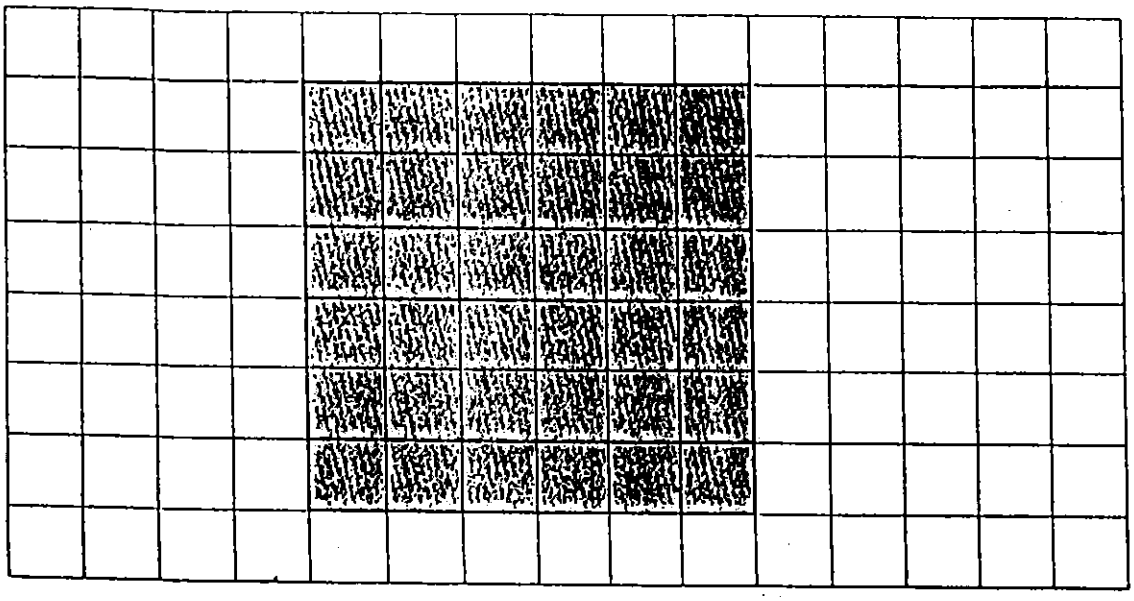
Answer $V =$ ..... [3]

12 A seven-sided polygon has one interior angle of 90°.
The other six interior angles are all equal.

Calculate the size of one of the six equal angles.

Answer ..... [3]

13



Part of the net of a cuboid is drawn on the 1 cm square grid above.

(a) Complete the net accurately. [1]

(b) Calculate the volume of the cuboid.

Answer (b) ..... cm^3 [1]

(c) Calculate the total surface area of the cuboid.

Answer (c) ..... cm^2 [1]

---

14 (a) Write down the value of x^{-1}, x^0, $x^{\frac{1}{2}}$, and x^2 when $x = \frac{1}{4}$.

Answer (a) x^{-1} .....

x^0 = ...

$x^{\frac{1}{2}}$ = ...

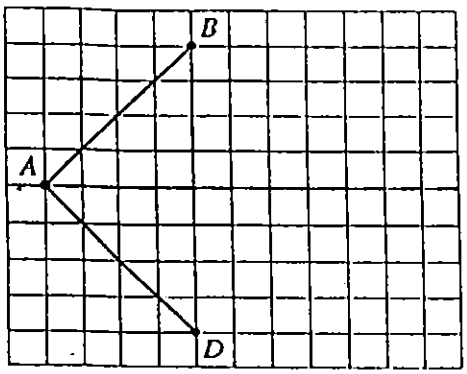
x^2 = ... [2]

(b) Write y^{-1}, y^0, y^2 and y^3 in increasing order of size when $y < -1$.

Answer (b) .....< .....< .....< ..... [2]

---

15 (a)

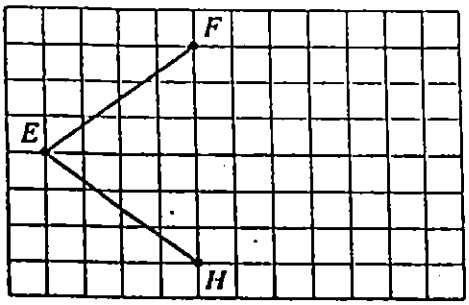


(i) Complete quadrilateral *ABCD* so that the dotted line is the only line of symmetry. [1]

(ii) Write down the special name for quadrilateral *ABCD*.

Answer (a)(ii) ..... [1]

(b)



(i) Complete quadrilateral *EFGH* so that the dotted line is one of two lines of symmetry. [1]

(ii) Write down the order of rotational symmetry for quadrilateral *EFGH*.

Answer (b)(ii) ..... [1]

---

16 $f(x) = x^{\frac{1}{3}}$ and $g(x) = 2x^2 - 5$ for all values of x.

(a) Find

(i) g(4),

Answer (a)(i) ..... [1]

(ii) fg(4).

Answer (a)(ii) ..... [1]

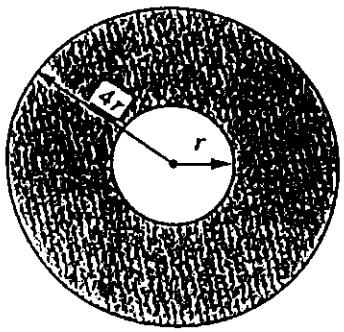
(b) Find an expression for gf(x) in terms of x.

Answer (b) gf(x) ..... [1]

(c) Find $f^{-1}(x)$.

Answer (c) $f^{-1}(x)$ ..... [1]

17



NOT TO SCALE

Two circles have radii r cm and $4r$ cm.
Find, in terms of π and r.

(a) the area of the circle with radius $4r$ cm,

Answer (a) ..... cm^2 [1]

(b) the area of the shaded ring,

Answer (b) ..... cm^2 [1]

(c) the total length of the inner and outer edges of the shaded ring.

Answer (c) ..... cm [2]

---

18 (a) Omar changed 800 rands into dollars when the rate was \$1 = 6.25 rands.

(i) How many dollars did Omar receive?

Answer (a)(i) \$ ..... [1]

(ii) Three months later he changed his dollars back into rands when the rate was \$1 = 6.45 rands. How many extra rands did he receive?

Answer (a)(ii) ..... rands [1]

(b) Omar's brother invested 800 rands for three months at a simple interest rate of 12% per year. How much interest did he receive?

Answer (b) ..... rands [2]

For Examiner's Use

19

$$A = \begin{pmatrix} 2 & -3 \\ -2 & 5 \end{pmatrix}, \qquad B = \begin{pmatrix} 4 & 3x \\ 0 & -1 \end{pmatrix}, \qquad C = \begin{pmatrix} 10 & -15 \\ -2 & 3 \end{pmatrix}.$$

(a) $A + 2B = C$.

(i) Write down an equation in x.

Answer (a)(i) ..... [1]

(ii) Find the value of x.

Answer (a)(ii) $x =$ ..... [1]

(b) Explain why C does not have an inverse.

Answer (b) .....[1]

(c) Find A^{-1}, the inverse of A.

Answer (c) $\begin{pmatrix} \quad & \quad \\ \quad & \quad \end{pmatrix}$ [2]

---

20 (a) Factorise

(i) $x^2 - 5x$,

Answer (a)(i) ..... [1]

(ii) $2x^2 - 11x + 5$.

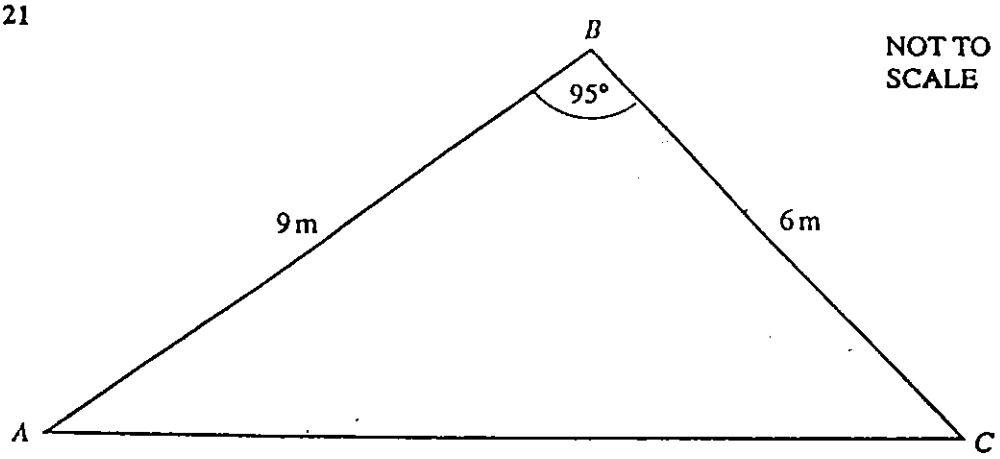
Answer (a)(ii) ..... [2]

(b) Simplify $\dfrac{x^2 - 5x}{2x^2 - 11x + 5}$.

Answer (b)..... [2]

For Examiner's Use

21



NOT TO SCALE

The triangular area ABC is part of Henri's garden.
$AB = 9$ m, $BC = 6$ m and angle $ABC = 95°$.
Henri puts a fence along AC and plants vegetables in the triangular area ABC.
Calculate

(a) the length of the fence AC,

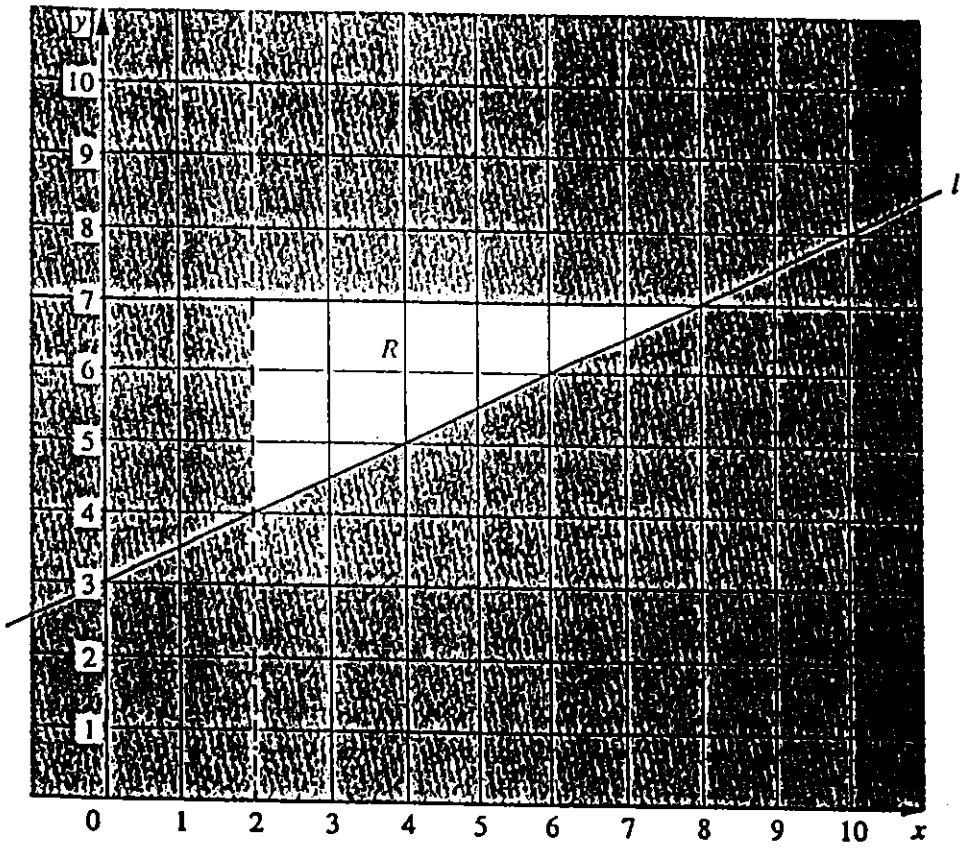
Answer (a) $AC =$ ..... m [3]

(b) the area for vegetables.

Answer (b) ..... m^2 [2]

For Examiner's Use

22



(a) **Find the equation of the line *l* shown in the grid above.**

Answer (a) ..... **[2]**

(b) **Write down three inequalities which define the region *R*.**

Answer (b) .....

.....

..... **[3]**

335

Candidate Number | Candidate Number

Candidate Name _____

CAMBRIDGE INTERNATIONAL EXAMINATIONS

International General Certificate of Secondary Education

MATHEMATICS 0580/2, 0581/2

PAPER 2

OCTOBER/NOVEMBER SESSION 2002

1 hour 30 minutes

Candidates answer on the question paper.
Additional materials:
Electronic calculator
Geometrical instruments
Mathematical tables (optional)
Tracing paper (optional)

TIME 1 hour 30 minutes

INSTRUCTIONS TO CANDIDATES

Write your name, Centre number and candidate number in the spaces at the top of this page.

Answer all questions.

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Electronic calculators should be used.

If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.

For π, use either your calculator value or 3.142.

FOR EXAMINER'S USE

This question paper consists of 11 printed pages and 1 blank page.

University of Cambridge Local Examinations Syndicate

[Turn over

1 The table shows the maximum daily temperatures during one week in Punta Arenas.

Monday	Tuesday	Wednesday	Thursday	Friday	Saturday	Sunday
2°C	3°C	1°C	2.5°C	−1.5°C	1°C	2°C

(a) By how many degrees did the maximum temperature change between Thursday and Friday?

Answer (a) ..... [1]

(b) What is the difference between the greatest and the least of these temperatures?

Answer (b) ..... [1]

---

2 Nyali paid $62 for a bicycle. She sold it later for $46.
What was her percentage loss?

Answer .....% [2]

---

3 Three sets A, B and K are such that $A \subset K$, $B \subset K$ and $A \cap B = \emptyset$.
Draw a Venn diagram to show this information.

[2]

---

4 Alejandro goes to Europe for a holiday.
He changes 500 pesos into euros at an exchange rate of 1 euro = 0.975 pesos.
How much does he receive in euros? Give your answer correct to 2 decimal places.

Answer .....euros [2]

---

5 Write the four values in order, smallest first.

$\frac{1}{1000}$, $\frac{11}{1000}$, 0.11%, 0.0108.

Answer ..... < ..... < ..... < ..... [2]

---

6 Write $2x - \frac{10x}{5-x}$ as a single fraction.

Answer ..... [2]

7 Find the exact value of

(a) 3^{-2},

Answer (a) ..... [1]

(b) $\left(1\frac{7}{9}\right)^{\frac{1}{2}}$.

Answer (b) ..... [2]

8 The length of a road is 380 m, correct to the nearest 10m.
Maria runs along this road at an average speed of 3.9 m/s.
This speed is correct to 1 decimal place.
Calculate the greatest possible time taken by Maria.

Answer ..... s [3]

For Examiner's Use

9 (a) Draw a quadrilateral which has rotational symmetry of order 2 and whose diagonals are equal in length.

[2]

(b) Write down the special name of this quadrilateral.

Answer (b) ..... [1]

---

10 For the numbers 8, 3, 5, 8, 7, 8 find

(a) the mode,

Answer (a) ..... [1]

(b) the median,

Answer (b) ..... [1]

(c) the mean.

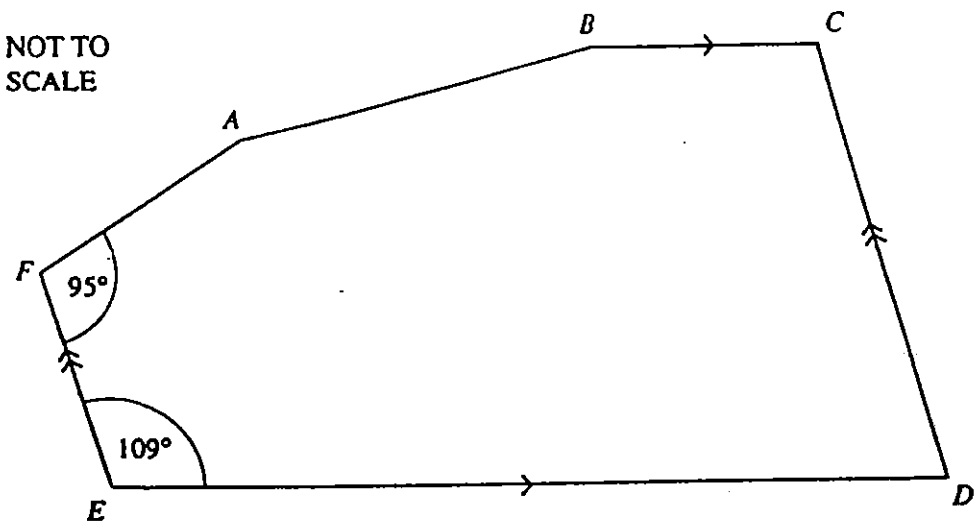
Answer (c) ..... [1]

---

11 The radius of the Earth at the equator is approximately 6.4×10^6 metres.
Calculate the circumference of the Earth at the equator. Give your answer in standard form, correct to 2 significant figures.

Answer .....m [3]

12



In the hexagon *ABCDEF*, *BC* is parallel to *ED* and *DC* is parallel to *EF*.
Angle *DEF* = 109° and angle *EFA* = 95°.
Angle *FAB* is equal to angle *ABC*.
Find the size of

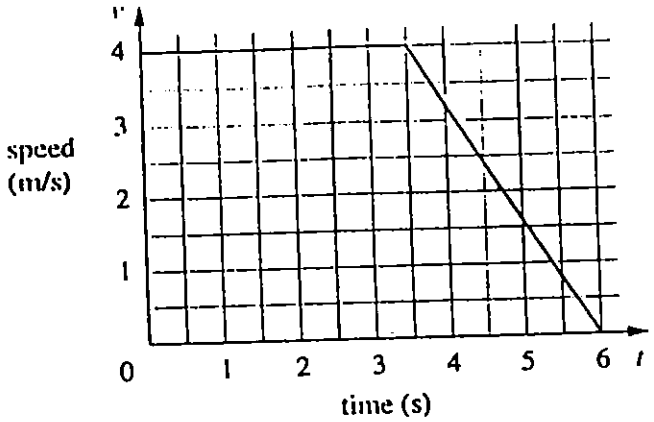
(a) angle *EDC*,

Answer (a) Angle *EDC* = ... [1]

(b) angle *FAB*.

Answer (b) Angle *FAB* = ... [2]

13



Ameni is cycling at 4 metres per second.
After 3.5 seconds she starts to decelerate and after a further 2.5 seconds she stops.
The diagram shows the speed-time graph for Ameni.
Calculate

(a) the constant deceleration,

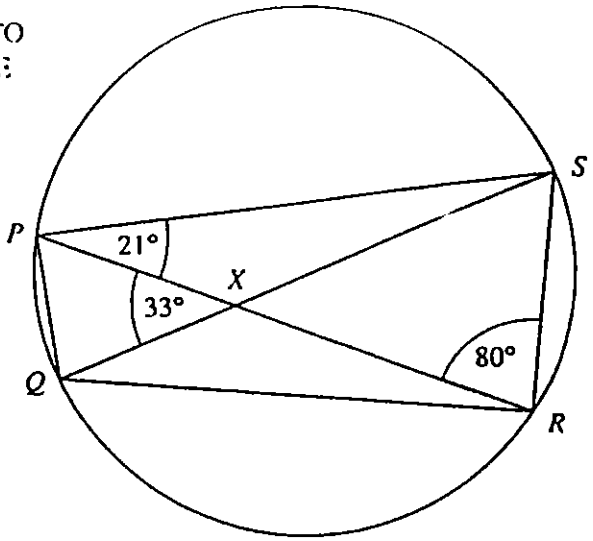
Answer (a) .....m/s^2 [1]

(b) the total distance travelled during the 6 seconds.

Answer (b) .....m [2]

14

NOT TO SCALE



PQRS is a cyclic quadrilateral. The diagonals *PR* and *QS* intersect at *X*.
Angle *SPR* = 21°, angle *PRS* = 80° and angle *PXQ* = 33°.
Calculate

(a) angle *PQS*,

Answer (a) Angle *PQS* = ... [1]

(b) angle *QPR*,

Answer (b) Angle *QPR* = ... [1]

(c) angle *PSQ*.

Answer (c) Angle *PSQ* = ... [1]

---

15 Solve the simultaneous equations

$$4x + 5y = 0,$$
$$8x - 15y = 5.$$

Answer x = ...

y = ... [4]

16 From a harbour, H, the bearing of a ship, S, is 312°. The ship is 3.5 km from the harbour.

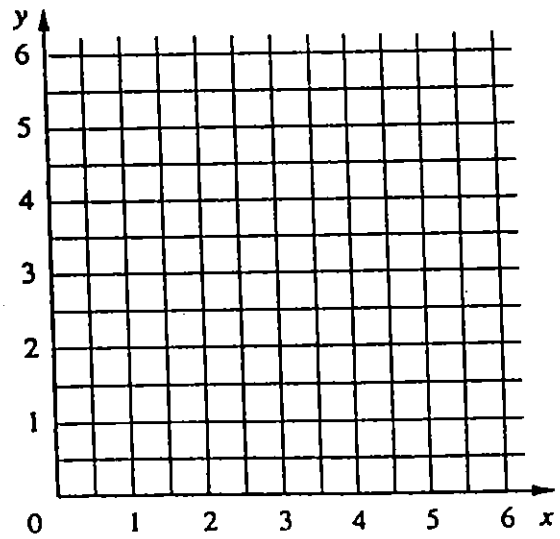
(a) Draw a sketch to show this information.
Label H, S, the length 3.5 km and the angle 312°.

[2]

(b) **Calculate** how far north the ship is of the harbour.

Answer (b) .....km [2]

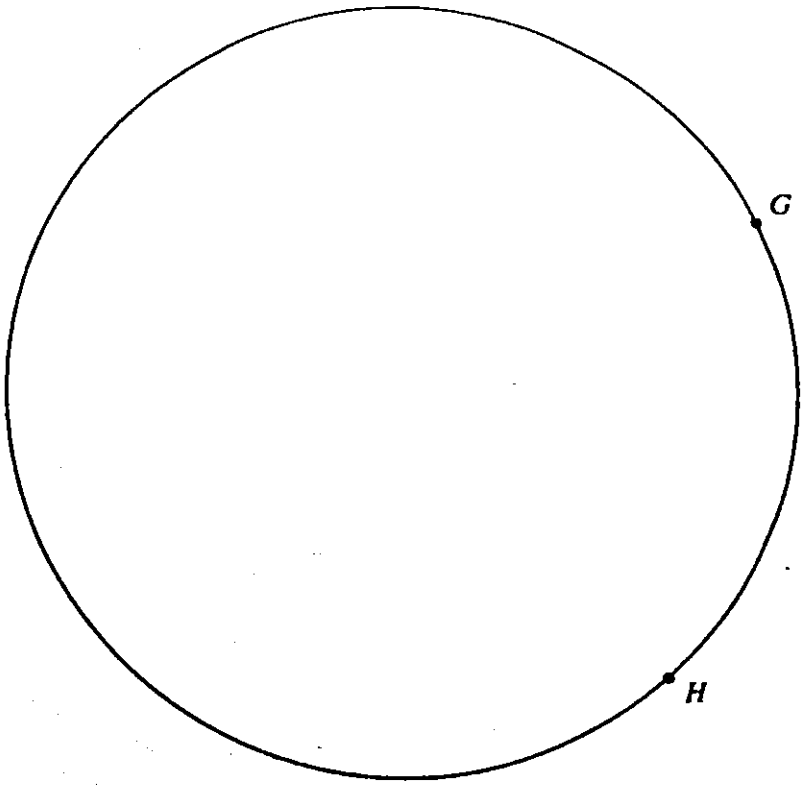
17



(a) On the grid, draw the lines $x = 1$, $y = 2$ and $x + y = 5$. [3]

(b) Write R in the region where $x \geqslant 1$, $y \geqslant 2$ and $x + y \geqslant 5$. [1]

18



Find, by using accurate constructions, the region inside the circle which contains the points more than 5 cm from G and nearer to H than to G. Shade this region. [4]

19 **(a) Solve the inequality** $5 - \frac{2x}{3} > \frac{1}{2} + \frac{x}{4}$.

Answer (a) x ..... [3]

(b) List the positive integers which satisfy the inequality

$$5 - \frac{2x}{3} > \frac{1}{2} + \frac{x}{4}.$$

Answer (b) ..... [1]

20 $f: x \to 2x - 1$ and $g: x \to x^2 - 1$.
Find, in their simplest forms,

(a) $f^{-1}(x)$,

Answer (a) $f^{-1}(x) =$ ..... [2]

(b) $gf(x)$.

Answer (b) $gf(x) =$ ..... [2]

---

21 $\mathbf{A} = \begin{pmatrix} 2 & -1 \\ 1 & 1 \end{pmatrix}$.

(a) Find the 2×2 matrix **P**, such that $\mathbf{A} + \mathbf{P} = \begin{pmatrix} 0 & 0 \\ 0 & 0 \end{pmatrix}$.

Answer (a) $\mathbf{P} =$ ( ) [2]

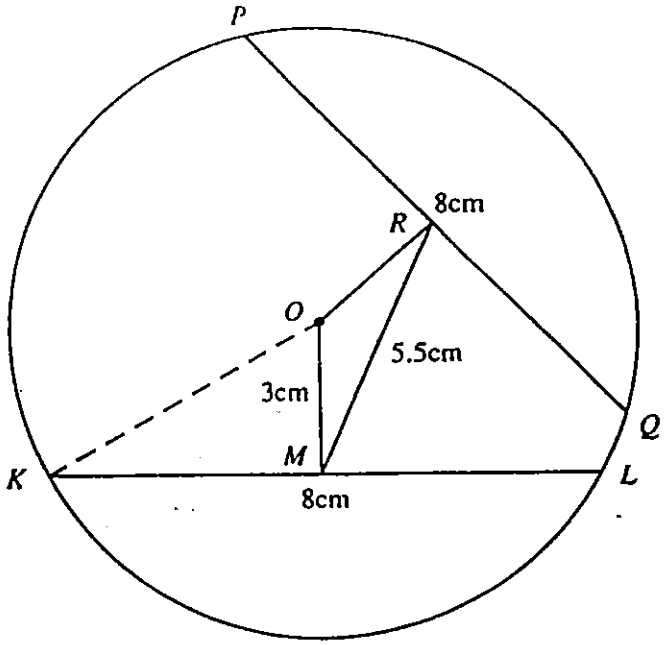
(b) Find the 2×2 matrix **Q**, such that $\mathbf{AQ} = \begin{pmatrix} 1 & 0 \\ 0 & 1 \end{pmatrix}$.

Answer (b) $\mathbf{Q} =$ ( ) [3]

For Examiner's Use

22

NOT TO SCALE



In the circle, centre *O*, the chords *KL* and *PQ* are each of length 8 cm. *M* is the mid-point of *KL* and *R* is the mid-point of *PQ*. *OM* = 3 cm.

(a) Calculate the length of *OK*.

Answer (a) $OK =$ .....cm [2]

(b) ***RM*** **has a length of 5.5 cm. Calculate angle *ROM*.**

Answer (b) Angle $ROM =$ ..... [3]

Centre Number	Candidate Number	Name	346

CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

MATHEMATICS

0580/02
0581/02

Paper 2

May/June 2003

1 hour 30 minutes

Candidates answer on the Question Paper.
Additional Materials: Electronic calculator
Geometric Instruments
Mathematical tables (optional)
Tracing paper (optional)

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen in the spaces provided on the Question Paper.
You may use a soft pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer all questions.
The number of marks is given in brackets [ ] at the end of each question or part question.

If working is needed for any question it must be shown below that question.
The total of the marks for this paper is 70.
Electronic calculators should be used.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142.

If you have been given a label, look at the details. If any details are incorrect or missing, please fill in your correct details in the space given at the top of this page.

Stick your personal label here, if provided.

For Examiner's Use

This document consists of 12 printed pages.

University of Cambridge
Local Examinations Syndicate

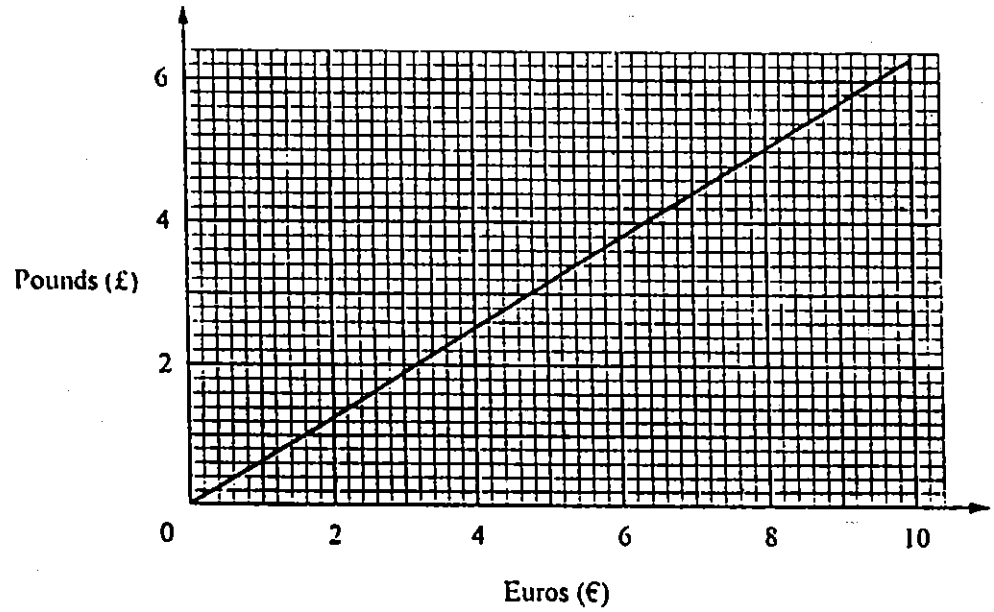
1 Write in order of size, smallest first,

$$\frac{5}{98}, \quad 0.049, \quad 5\%.$$

Answer .....<.....<..... [2]

---

2 The graph below can be used to convert between euros (€) and pounds (£).



(a) Change £5 into euros.

Answer (a) € ..... [1]

(b) Change €90 into pounds.

Answer (b) £ ..... [1]

---

3 The top speed of a car is 54 metres per second.
Change this speed into kilometres per hour.

Answer .....km/h [2]

---

4 $\mathbf{a} = \begin{pmatrix} 2 \\ -3 \end{pmatrix}$ and $\mathbf{b} = \begin{pmatrix} 5 \\ -1 \end{pmatrix}$. Find $3\mathbf{a} - 2\mathbf{b}$.

Answer $\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [2]

For Examiner's use

5 The ratios of teachers : male students : female students in a school are 2 : 17 : 18.
The total number of **students** is 665.
Find the number of **teachers**.

Answer ..... [2]

---

6 A rectangular field is 18 metres long and 12 metres wide.
Both measurements are correct to the nearest metre.
Work out exactly the smallest possible area of the field.

Answer .....m^2 [2]

---

7 **Solve the inequality** $3 < 2x - 5 < 7$.

Answer ..... $< x <$ ..... [2]

---

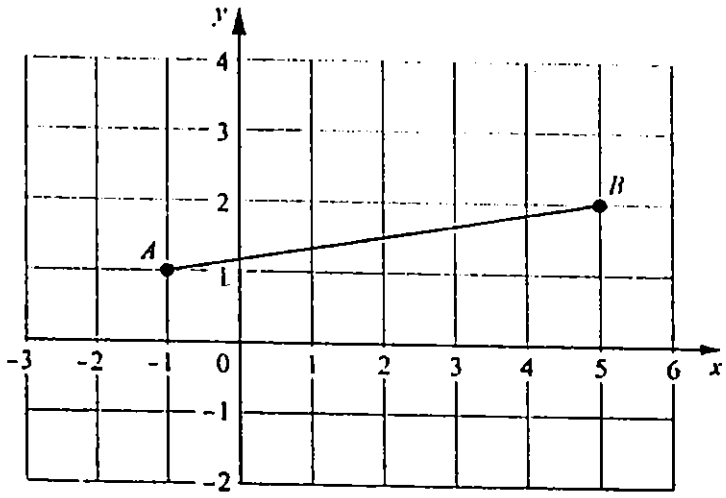
8 Complete this table of squares and cubes.
The numbers are not in sequence.

Number	Square	Cube
3	9	27
.....	121	.....
.....	.....	2744
.....	.....	−343

[3]

For Examiner's use

9



(a) Find the gradient of the line AB.

Answer (a)..... [1]

(b) Calculate the angle that AB makes with the x-axis.

Answer (b)..... [2]

---

10 Work out as a single fraction

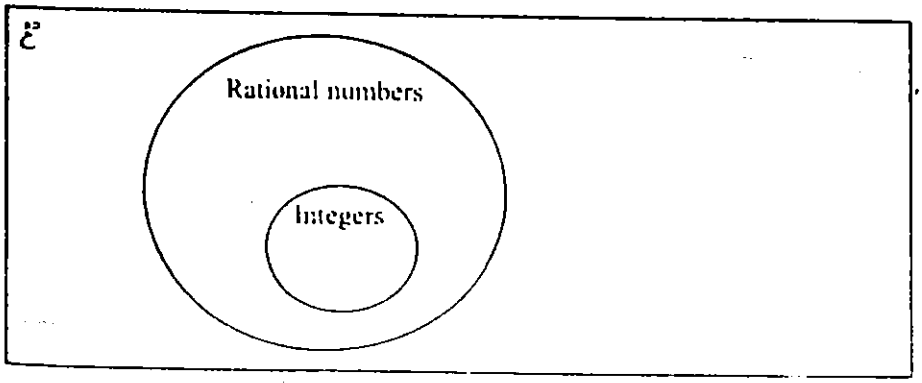
$$\frac{2}{x-3} - \frac{1}{x+4}.$$

Answer ..... [3]

---

11 Write each of these four numbers in the correct place in the Venn Diagram below.

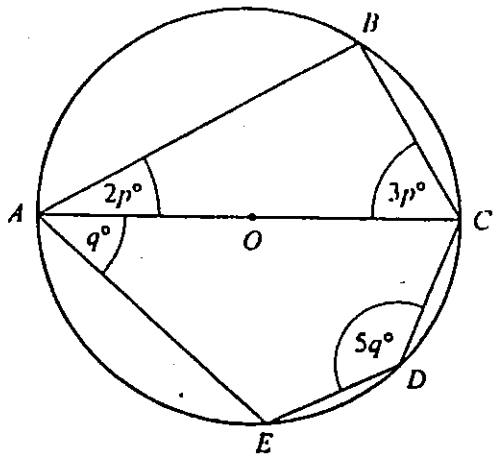
$$2.6, \quad \frac{4}{17}, \quad \sqrt{12}, \quad \sqrt{\frac{112}{7}}$$



[4]

For Examiner's use

12



NOT TO SCALE

A, B, C, D and E lie on a circle, centre O. AOC is a diameter.
Find the value of

(a) p,

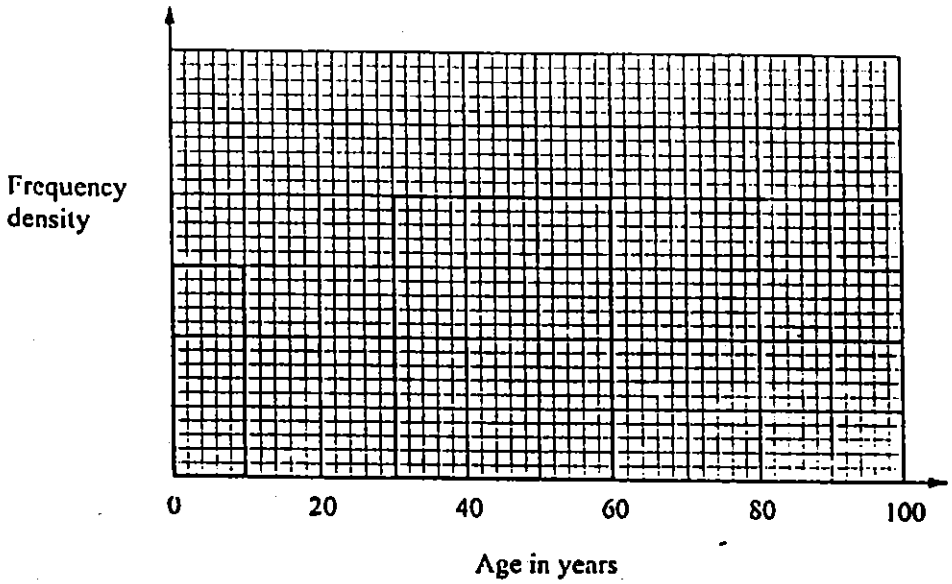
Answer (a) $p =$ ..... [2]

(b) q.

Answer (b) $q =$ ..... [2]

13 A doctor's patients are grouped by age, as shown in the table and the histogram below.

Age (x years)	$0 \leqslant x < 10$	$10 \leqslant x < 30$	$30 \leqslant x < 60$	$60 \leqslant x < 100$
Number of patients	300	600		880



(a) Complete the following:

1 cm^2 represents ..... patients. [1]

(b) Use the histogram to fill in the blank in the table. [1]

(c) Draw the missing two rectangles to complete the histogram. [2]

---

14 (a) Multiply $\begin{pmatrix} 5 & 4 \\ -3 & -2 \end{pmatrix}\begin{pmatrix} 2 & 1 & -4 \\ 0 & 3 & 6 \end{pmatrix}$.

Answer (a) $\begin{pmatrix} & & \end{pmatrix}$ [2]

(b) Find the inverse of $\begin{pmatrix} 5 & 4 \\ -3 & -2 \end{pmatrix}$.

Answer (b) $\begin{pmatrix} & \end{pmatrix}$ [2]

For Examiner's use

15 In 1950, the population of Switzerland was 4 714 900.
In 2000, the population was 7 087 000.

(a) Work out the percentage increase in the population from 1950 to 2000.

Answer (a)..... % [2]

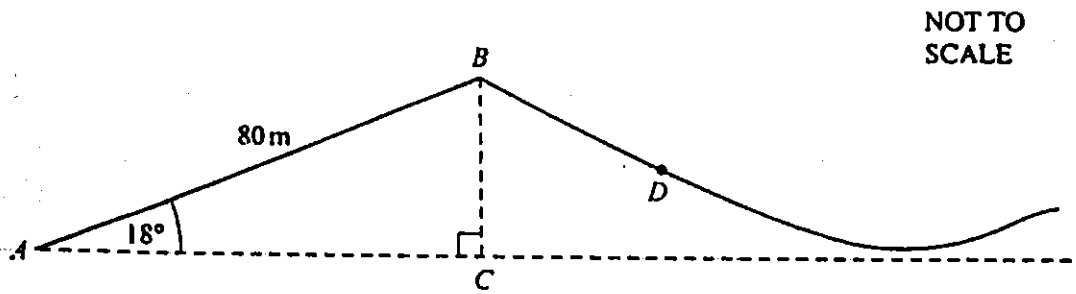
(b) (i) Write the 1950 population correct to 3 significant figures.

Answer (b)(i) ..... [1]

(ii) Write the 2000 population in standard form.

Answer (b)(ii) ..... [1]

16



The diagram shows the start of a roller-coaster ride at a fairground.
A car rises from A to B along a straight track.

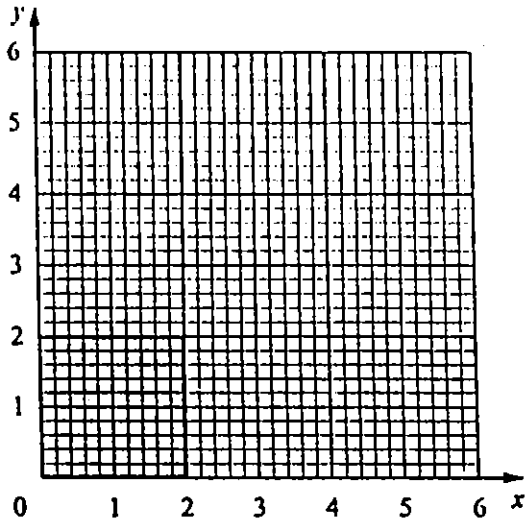
(a) $AB = 80$ metres and angle $BAC = 18°$.
Calculate the vertical height of B above A.

Answer (a)..... m [2]

(b) The car runs down the slope from B to D, a distance of s metres.
Use the formula $s = t(p + qt)$ to find the value of s, given that $p = 4$, $t = 3$ and $q = 3.8$.

Answer (b) $s =$ ..... [2]

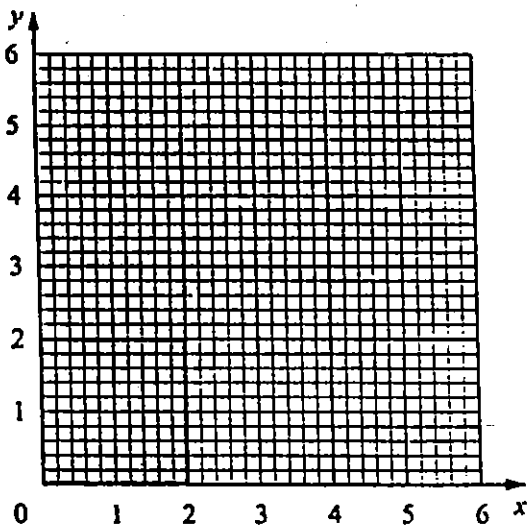
17 (a)



Draw the shear of the shaded square with the x-axis invariant and the point $(0, 2)$ mapping onto the point $(3, 2)$.

[2]

(b)



(i) Draw the one-way stretch of the shaded square with the x-axis invariant and the point $(0, 2)$ mapping onto the point $(0, 6)$.

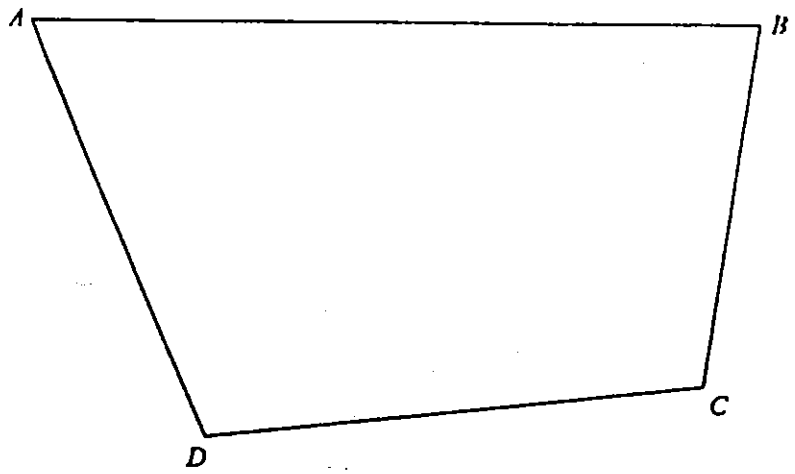
[2]

(ii) Write down the matrix of this stretch.

Answer (b)(ii) $\begin{pmatrix} & \\ & \end{pmatrix}$ [1]

For Examiner's use

18 The diagram is a scale drawing of a field. The actual length of the side AB is 100 metres.



(a) Write the scale of the drawing in the form 1 : n, where n is an integer.

Answer (a) 1 : ..... [1]

(b) In this part use a straight edge and compasses only. Leave in your construction lines.

(i) A tree in the field is equidistant from the point A and the point D. Construct the line on which the tree stands. [2]

(ii) The tree is also equidistant from the sides BC and CD. After constructing another line, mark the position of the tree and label it T. [3]

For Examiner's use

19 A ferry has a deck area of 3600 m^2 for parking cars and trucks.
Each car takes up 20 m^2 of deck area and each truck takes up 80 m^2.
On one trip, the ferry carries x cars and y trucks.

(a) Show that this information leads to the inequality $x + 4y \leq 180$.

[2]

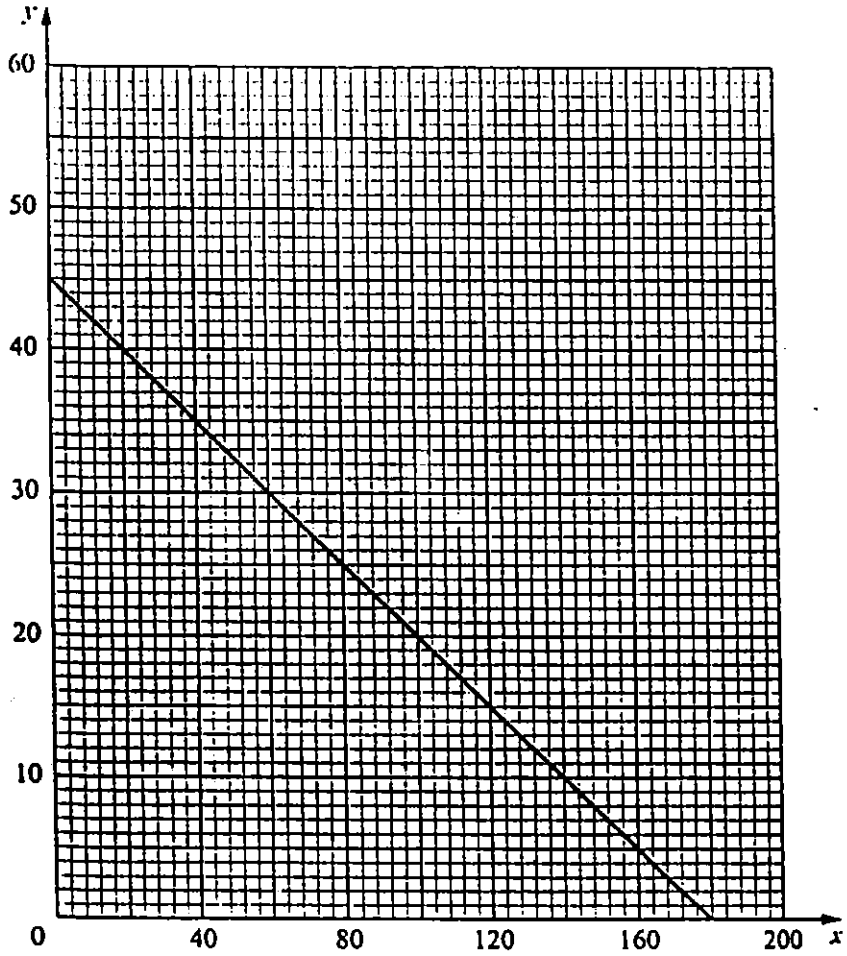
(b) The charge for the trip is \$25 for a car and \$50 for a truck.
The total amount of money taken is \$3000.
Write down an equation to represent this information and simplify it.

Answer (b)..... [2]

For Examiner's use

(c) The line $x + 4y = 180$ is drawn on the grid below.

(i) Draw, on the grid, the graph of your equation in part (b).



[1]

(ii) Write down a possible number of cars and a possible number of trucks on the trip, which together satisfy both conditions.

Answer (c)(ii) ..... cars,..... trucks [1]

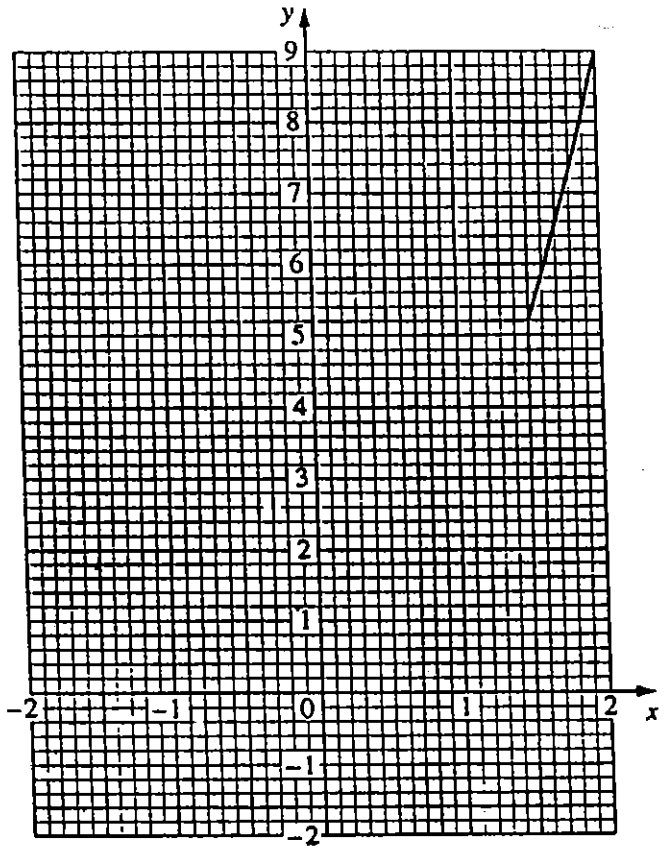
For Examiner's use

20 (a) Complete the table of values for $y = 3^x$.

x	−2	−1.5	−1	−0.5	0	0.5	1	1.5	2
y		0.2						5.2	9

[3]

(b) Use your table to complete the graph of $y = 3^x$ for $-2 \leq x \leq 2$.



[2]

(c) Use the graph to find the solution of the equation

$$3^x = 6.$$

Answer (c) $x =$ ..... [1]

Centre Number	Candidate Number	Name

CAMBRIDGE INTERNATIONAL EXAMINATIONS
International General Certificate of Secondary Education

MATHEMATICS

0580/02
0581/02

Paper 2

October/November 2003

1 hour 30 minutes

Candidates answer on the Question Paper.
Additional Materials: Electronic calculator
Geometrical instruments
Mathematical tables (optional)
Tracing paper (optional)

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen in the spaces provided on the Question Paper.
You may use a pencil for any diagrams or graphs.
Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer all questions.
If working is needed for any question it must be shown below that question.
The number of marks is given in brackets [ ] at the end of each question or part question.

The total of the marks for this paper is 70.
Electronic calculators should be used.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Answers in degrees should be given to one decimal place.
For π, use either your calculator value or 3.142.

If you have been given a label, look at the details. If any details are incorrect or missing, please fill in your correct details in the space given at the top of this page.

Stick your personal label here, if provided.

For Examiner's Use

This document consists of 10 printed pages and 2 blank pages.

University of Cambridge
Local Examinations Syndicate

For Examiner's use

1 Work out $\dfrac{2+12}{4+3\times 8}$.

Answer ..... [1]

---

2 The altitude of Death Valley is −86 metres.
The altitude of Mount Whitney is 4418 metres.
Calculate the difference between these two altitudes.

Answer ..... m [1]

---

3 The first five terms of a sequence are 4, 9, 16, 25, 36, ...
Find

(a) the 10th term,

Answer (*a*)..... [1]

(b) the *n*th term.

Answer (*b*)..... [1]

---

4 Rearrange the quantities in order with the smallest first.

$\frac{1}{8}\%$, $\frac{1}{2500}$, 0.00126

Answer.....<.....<....., [2]

---

5 $\mathscr{E} = \{-2\frac{1}{2},\ -1,\ \sqrt{2},\ 3.5,\ \sqrt{30},\ \sqrt{36}\}$
$X = \{\text{integers}\}$
$Y = \{\text{irrational numbers}\}$
List the members of

(a) X,

Answer (*a*) $X = \{$ ..... $\}$ [1]

(b) Y.

Answer (*b*) $Y = \{$ ..... $\}$ [1]

For Examiner's use

10 When cars go round a bend there is a force, F, between the tyres and the ground.
F varies directly as the square of the speed, v.
When $v = 40$, $F = 18$.
Find F when $v = 32$.

Answer $F =$ ..... [3]

---

11 In April 2001, a bank gave the following exchange rates.
1 euro = 0.623 British pounds.
1 euro = 1936 Italian lire.

(a) Calculate how much one pound was worth in lire.

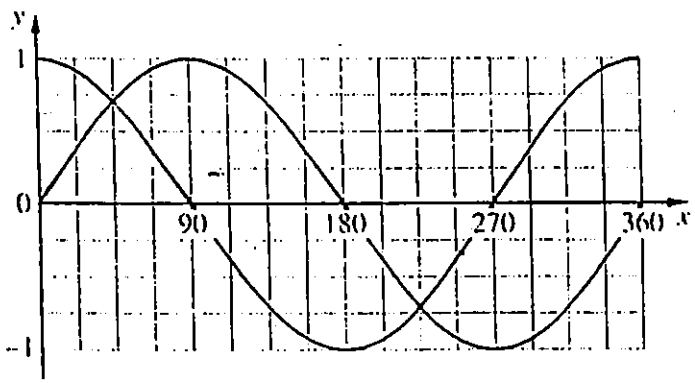
Answer (a) .....lire [2]

(b) Calculate how much one million Lire was worth in pounds.

Answer (b) .....pounds [1]

---

12 The diagram shows the graphs of $y = \sin x°$ and $y = \cos x°$.



Find the values of x between 0 and 360 for which

(a) $\sin x° = \cos x°$,

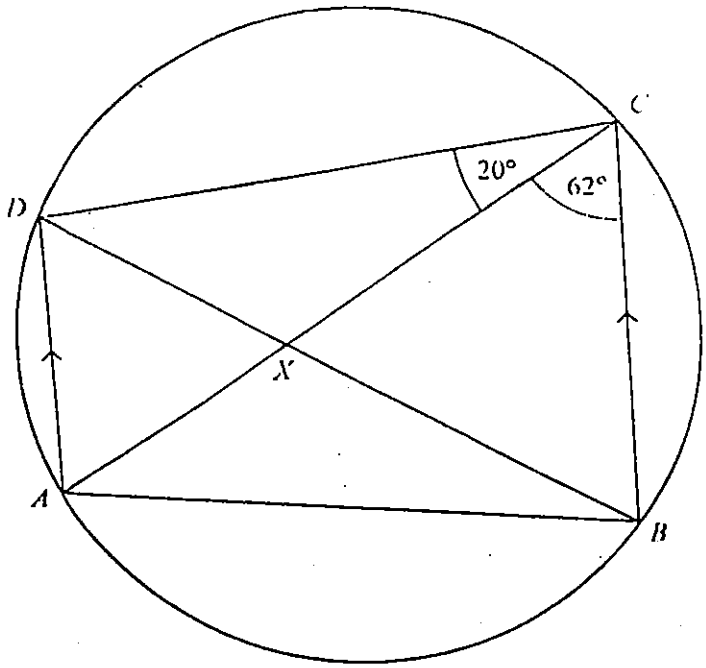
Answer (a) $x =$ ..... or $x =$ ..... [2]

(b) $\sin x° = \sin 22.5°$ $(x \neq 22.5)$.

Answer (b) $x =$ ..... [1]

For Examiner's use

17



NOT TO SCALE

ABCD is a cyclic quadrilateral.
AD is parallel to *BC*. The diagonals *DB* and *AC* meet at *X*.
Angle *ACB* = 62° and angle *ACD* = 20°.
Calculate

(a) angle *DBA*,

Answer (*a*) Angle *DBA* = ... [1]

(b) angle *DAB*,

Answer (*b*) Angle *DAB* = ... [1]

(c) angle *DAC*,

Answer (*c*) Angle *DAC* = ... [1]

(d) angle *AXB*,

Answer (*d*) Angle *AXB* = ... [1]

(e) angle *CDB*.

Answer (*e*) Angle *CDB* = ... [1]

18 The population of Europe is 580 000 000 people.
The land area of Europe is 5 900 000 square kilometres.

(a) Write 580 000 000 in standard form.

Answer (a)..... [1]

(b) Calculate the number of people per square kilometre, to the nearest whole number.

Answer (b) ..... [2]

(c) Calculate the number of square metres per person.

Answer (c) ..... m^2 [2]

---

19 f: $x \rightarrow 1 - 2x$ and g: $x \rightarrow \frac{x}{2}$.

(a) Find fg(7).

Answer (a) ..... [2]

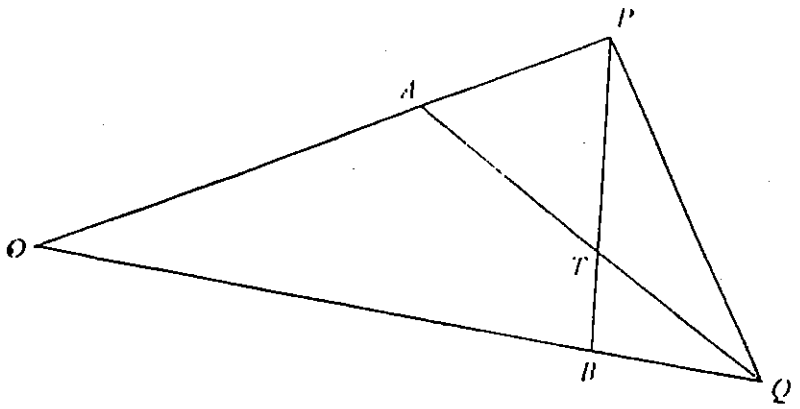
(b) (i) Solve $f(x) = g(x)$.

Answer (b)(i) $x =$ ..... [2]

(ii) The graphs of $y = f(x)$ and $y = g(x)$ meet at M.
Find the coordinates of M.

Answer (b)(ii) (..... .....) [1]

20



NOT TO SCALE

In the diagram $OA = \frac{2}{3}OP$ and $OB = \frac{3}{4}OQ$.
$\overrightarrow{OP} = \mathbf{p}$ and $\overrightarrow{OQ} = \mathbf{q}$.

(a) Find in terms of **p** and **q**

(i) $\overrightarrow{AQ}$.

Answer (*a*)(i) $\overrightarrow{AQ}$ = ... [2]

(ii) $\overrightarrow{BP}$.

Answer (*a*)(ii) $\overrightarrow{BP}$ = ... [2]

(b) AQ and BP intersect at T.
$BT = \frac{1}{5}BP$.
Find $\overrightarrow{QT}$ in terms of **p** and **q**, in its simplest form.

Answer (*b*) $\overrightarrow{QT}$ = ... [2]

21 Marina goes to the shop to buy loaves of bread and cakes.
One loaf of bread costs 60 cents and one cake costs 80 cents.
She buys x loaves of bread and y cakes.

(a) She must not spend more than \$12.
Show that $3x + 4y \leqslant 60$.

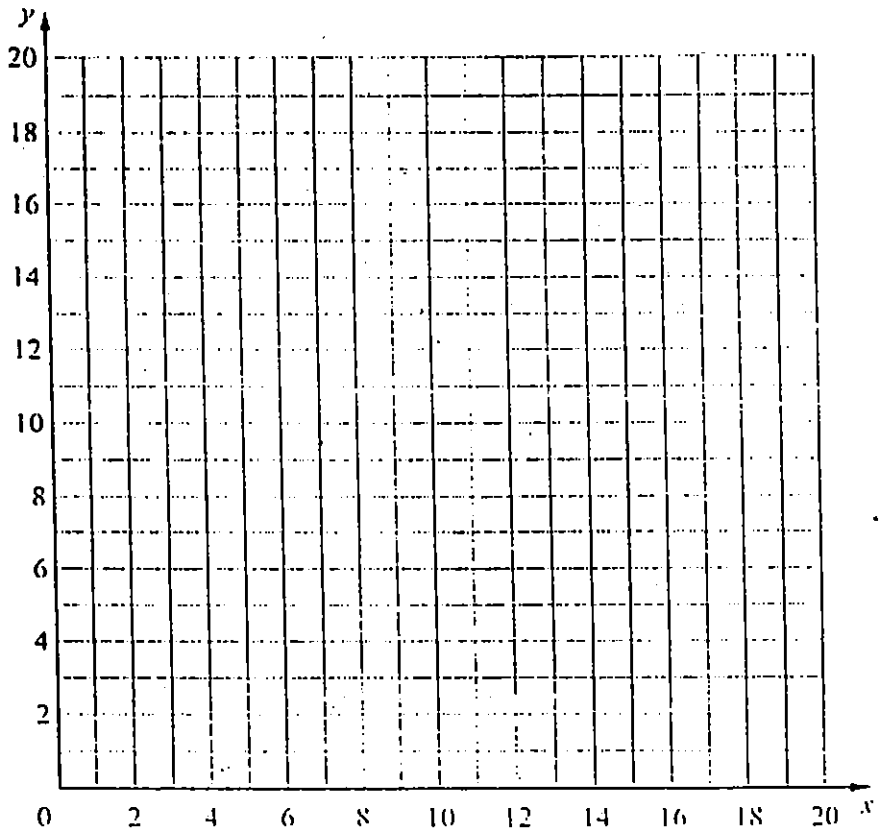
Answer (a)

[1]

(b) The number of loaves of bread must be greater than or equal to the number of cakes.
Write down an inequality in x and y to show this information.

Answer (b)..... [1]

(c) On the grid below show the two inequalities by shading the **unwanted** regions.
Write R in the required region.



[4]

(d) The **total** number of loaves of bread and cakes is $x + y$.
Find the largest possible value of $x + y$.

Answer (d) ..... [1]