Centre No.						Paper Reference	Surname	Initial(s)
Candidate No.						5 5 0 5 / 0 5	Signature	

Paper Reference(s)

5505/05

Edexcel GCSE

Mathematics A – 1387

Paper 5 (Non Calculator)

Higher Tier

Tuesday 8 June 2004 – Afternoon

Time: 2 hours

Examiner's use only

Team Leader's use only

Materials required for examination

Ruler graduated in centimetres and millimetres, protractor, compasses, pen, HB pencil, eraser.
Tracing paper may be used.

Items included with question papers

Nil

Instructions to Candidates

In the boxes above, write your centre number, candidate number, your surname, initials and signature.
Answer **ALL** the questions in the spaces provided in this question paper.
Check that you have the correct question paper.
You must NOT write on the formulae page or any blank pages. Anything you write on these pages will gain NO credit.
If you need more space to complete your answer to any question, use additional answer sheets.

Information for Candidates

The total mark for this paper is 100. This paper has 20 questions. There is one blank page.
The marks for individual questions and parts of questions are shown in round brackets: e.g. **(2)**.
Calculators must not be used.

Advice to Candidates

Show all stages in any calculations.
Work steadily through the paper. Do not spend too long on one question.
If you cannot answer a question, leave it and attempt the next one.
Return at the end to those you have left out.

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Edexcel
Success through qualifications

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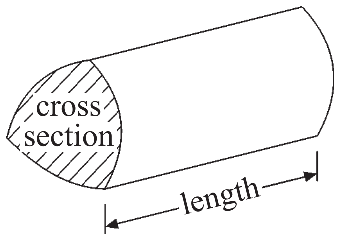
GCSE Mathematics 1387/8

Higher Tier Formulae

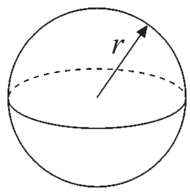
You must not write on this page.
Anything you write on this page will gain NO credit.

Volume of a prism = area of cross section × length



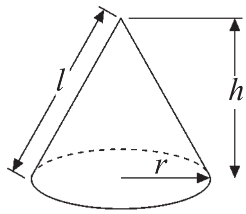
Volume of sphere $= \frac{4}{3}\pi r^3$

Surface area of sphere $= 4\pi r^2$

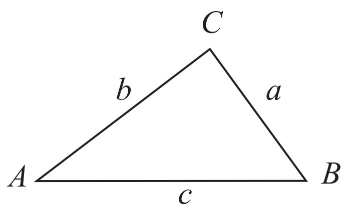


Volume of cone $= \frac{1}{3}\pi r^2 h$

Curved surface area of cone $= \pi r l$



In any triangle ABC



Sine Rule $\dfrac{a}{\sin A} = \dfrac{b}{\sin B} = \dfrac{c}{\sin C}$

Cosine Rule $a^2 = b^2 + c^2 - 2bc\cos A$

Area of triangle $= \frac{1}{2}ab\sin C$

The Quadratic Equation

The solutions of $ax^2 + bx + c = 0$
where $a \neq 0$, are given by

$$x = \frac{-b \pm \sqrt{(b^2 - 4ac)}}{2a}$$

Leave blank

Answer ALL TWENTY questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

You must NOT use a calculator.

1. (a) Use the information that

$$13 \times 17 = 221$$

to write down the value of

(i) 1.3×1.7

....

(ii) $22.1 \div 1700$

....

(2)

(b) Use the information that

$$13 \times 17 = 221$$

to find the Lowest Common Multiple (LCM) of 39 and 17

....

(2)

2. The table shows some expressions.
The letters a, b, c and d represent lengths.
π and 2 are numbers that have no dimensions.
Three of the expressions could represent areas.

Tick (✓) the boxes underneath the **three** expressions which could represent areas.

$\frac{\pi abc}{2d}$	πa^3	$2a^2$	$\pi a^2 + b$	$\pi(a+b)$	$2(c^2+d^2)$	$2ad^2$

(3)

Page Total

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3. The probability that a biased dice will land on a four is 0.2

Pam is going to roll the dice 200 times.

(a) Work out an estimate for the number of times the dice will land on a four.

....
(2)

The probability that the biased dice will land on a six is 0.4
Ted rolls the biased dice once.

(b) Work out the probability that the dice will land on either a four or a six.

....
(2)

4. (a) Express 108 as the product of powers of its prime factors.

....
(3)

(b) Find the Highest Common Factor (HCF) of 108 and 24

....
(1)

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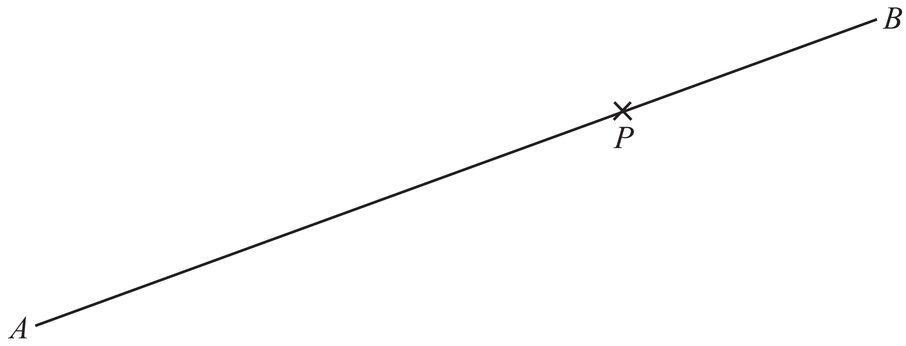
5. Use ruler and compasses to **construct** the perpendicular to the line segment *AB* that passes through the point *P*.
You must show all construction lines.



(2)

6. The diagram shows a wedge in the shape of a triangular prism.

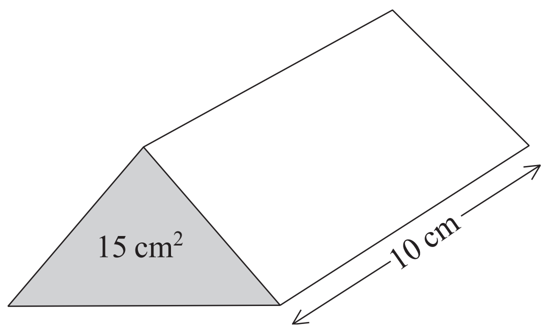


Diagram **NOT** accurately drawn

The cross section of the prism is shown as a shaded triangle.

The area of the triangle is 15 cm^2.
The length of the prism is 10 cm.

Work out the volume of the prism.

....

(3)

Page Total

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7. (a) Simplify $k^5 \div k^2$

....
(1)

(b) Expand and simplify

(i) $4(x+5)+3(x-7)$

....

(ii) $(x+3y)(x+2y)$

....
(4)

(c) Factorise $(p+q)^2+5(p+q)$

....
(1)

(d) Simplify $(m^{-4})^{-2}$

....
(1)

(e) Simplify $2t^2 \times 3r^3t^4$

....
(2)

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8. Each side of a regular pentagon has a length of 101 mm, correct to the nearest millimetre.

(i) Write down the **least** possible length of each side.

.... mm

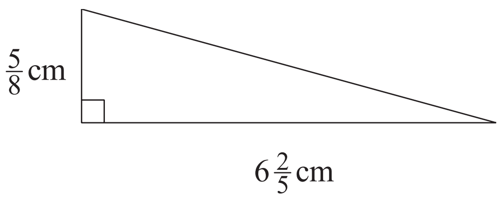
(ii) Write down the **greatest** possible length of each side.

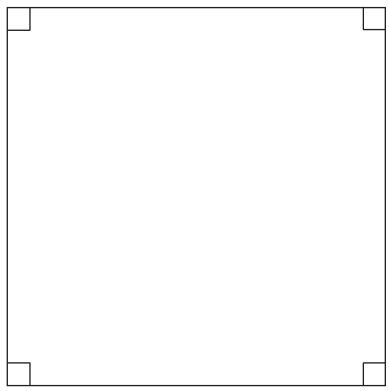
.... mm

(2)

9.

Diagrams **NOT** accurately drawn





The area of the square is 18 times the area of the triangle.

Work out the **perimeter** of the square.

.... cm

(5)

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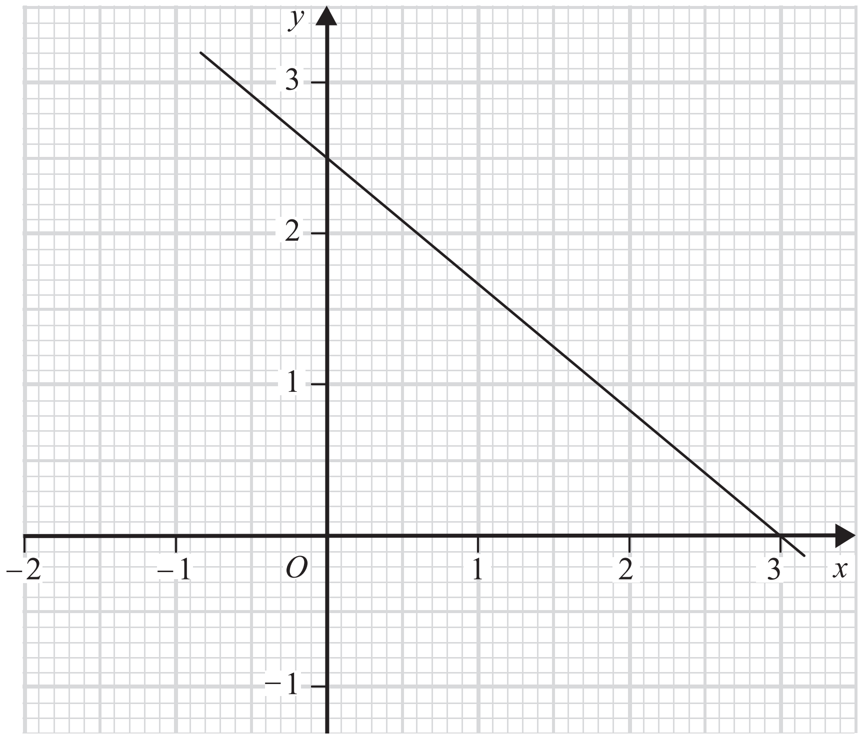
10.



The line with equation $6y + 5x = 15$ is drawn on the grid above.

(a) Rearrange the equation $6y + 5x = 15$ to make y the subject.

$y =$ ....

(2)

(b) The point (–21, k) lies on the line.
Find the value of k.

$k =$ ....

(2)

(c) (i) On the grid, shade the region of points whose coordinates satisfy the four inequalities

$y > 0, \quad x > 0, \quad 2x < 3, \quad 6y + 5x < 15$

Label this region ***R***.

P is a point in the region ***R***. The coordinates of P are both integers.

(ii) Write down the coordinates of P.

(............ , ...)

(3)

11.

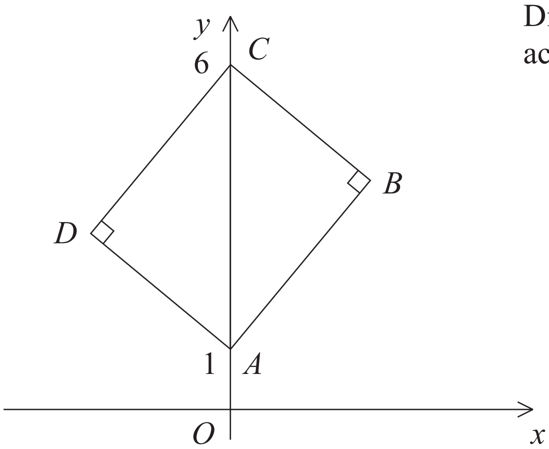


Diagram **NOT** accurately drawn

ABCD is a rectangle.
A is the point (0, 1).
C is the point (0, 6).

The equation of the straight line through *A* and *B* is $y = 2x + 1$

(a) Find the equation of the straight line through *D* and *C*.

....
(2)

(b) Find the equation of the straight line through *B* and *C*.

....
(2)

(c) It is always possible to draw a circle which passes through all four vertices of a rectangle.
Explain why.

....

....
(1)

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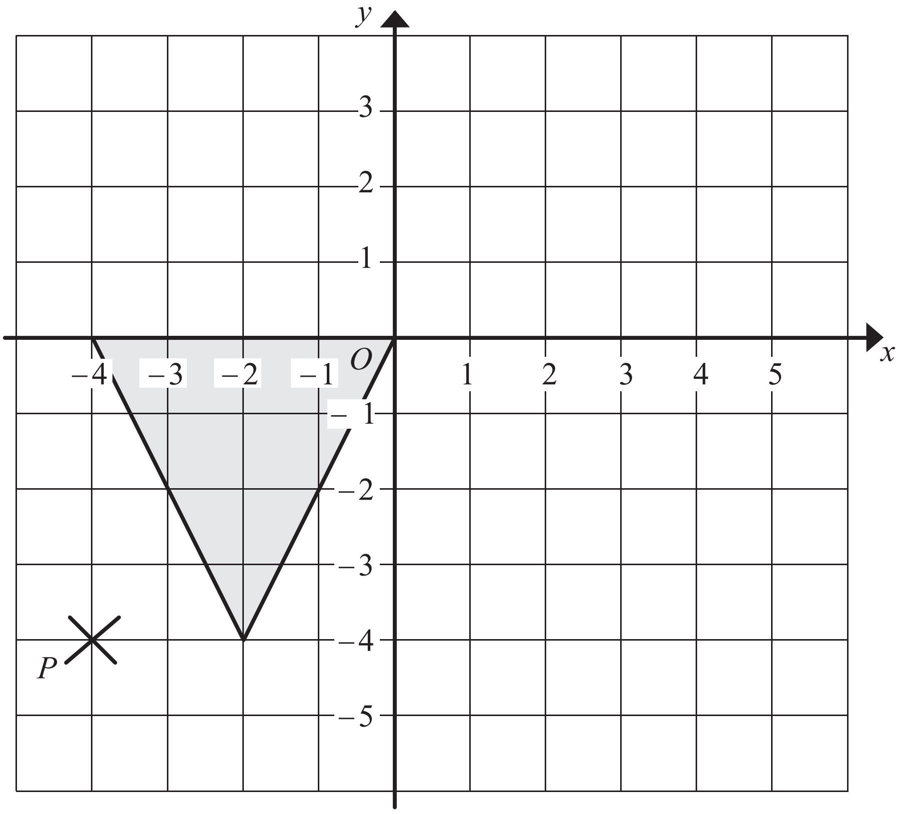
12.



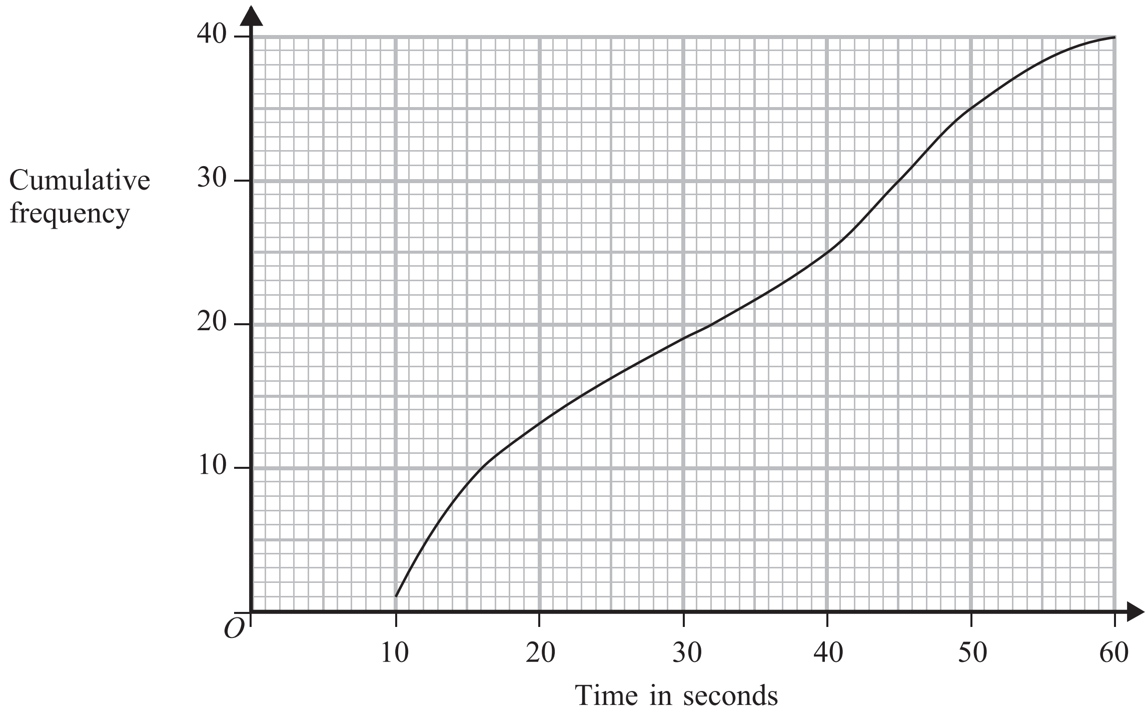
Enlarge the shaded triangle by a scale factor $1\frac{1}{2}$, centre P.

(3)

13. 40 boys each completed a puzzle.
The cumulative frequency graph opposite gives information about the times it took them to complete the puzzle.

(a) Use the graph to find an estimate for the median time.

.... seconds
(1)

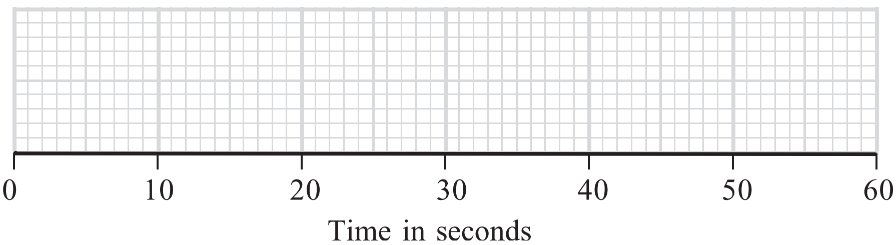


For the boys

the minimum time to complete the puzzle was 9 seconds

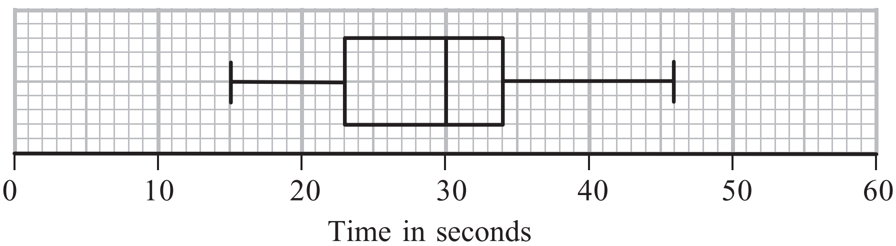
and the maximum time to complete the puzzle was 57 seconds.

(b) Use this information and the cumulative frequency graph to draw a box plot showing information about the boys' times.



(3)

The box plot below shows information about the times taken by 40 girls to complete the same puzzle.



(c) Make **two** comparisons between the boys' times and the girls' times.

....

....

(2)

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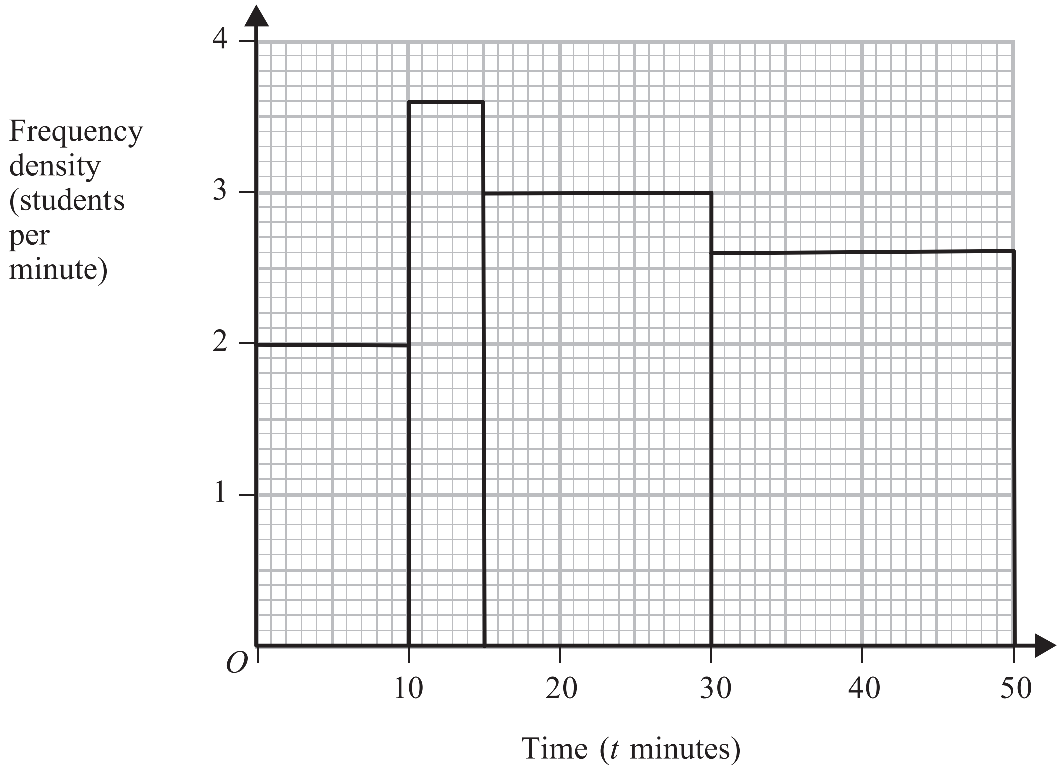
14. The histogram gives information about the times, in minutes, 135 students spent on the Internet last night.



Use the histogram to complete the table.

Time (t minutes)	Frequency
$0 < t \leqslant 10$	
$10 < t \leqslant 15$	
$15 < t \leqslant 30$	
$30 < t \leqslant 50$	
TOTAL	135

(2)

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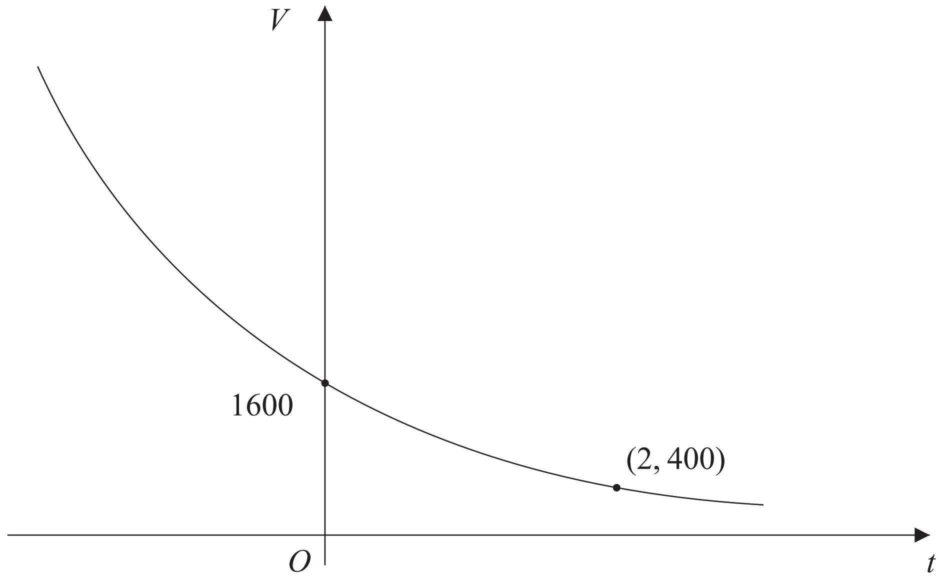
15. Mr Patel has a car.



The value of the car on January 1st 2000 was £1600
The value of the car on January 1st 2002 was £400

The sketch graph shows how the value, £V, of the car changes with time.
The equation of the sketch graph is

$$V = pq^t$$

where t is the number of years after January 1st 2000.
p and q are positive constants.

(a) Use the information on the graph to find the value of p and the value of q.

p = ... q = ...
(3)

(b) Using your values of p and q in the formula $V = pq^t$ find the value of the car on January 1st 1998.

£ ....
(2)

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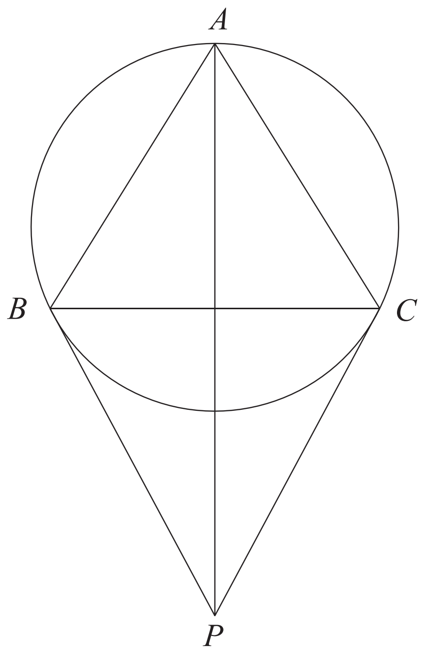
16.



A, *B* and *C* are three points on the circumference of a circle.
Angle *ABC* = Angle *ACB*.
PB and *PC* are tangents to the circle from the point *P*.

(a) Prove that triangle *APB* and triangle *APC* are congruent.

(3)

Angle *BPA* = 10°.

(b) Find the size of angle *ABC*.

.... °

(4)

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17.

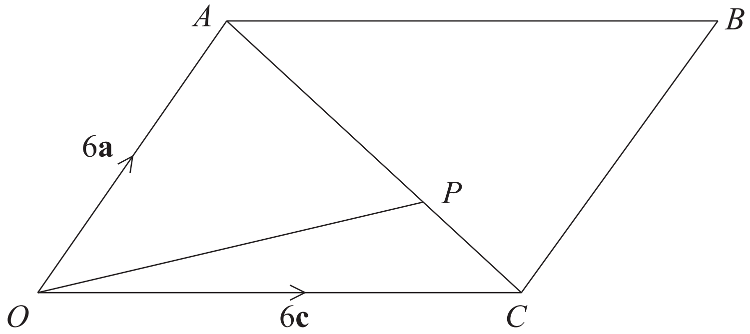

Diagram **NOT** accurately drawn

OABC is a parallelogram.

P is the point on *AC* such that $AP = \frac{2}{3}AC$.

$\overrightarrow{OA} = 6\mathbf{a}$. $\overrightarrow{OC} = 6\mathbf{c}$.

(a) Find the vector $\overrightarrow{OP}$.
Give your answer in terms of **a** and **c**.

....
(3)

The midpoint of *CB* is *M*.

(b) Prove that *OPM* is a straight line.

(2)

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18.

(a) Find the value of $16^{\frac{1}{2}}$

....

(1)

(b) Given that $\sqrt{40} = k\sqrt{10}$, find the value of k.

....

(1)

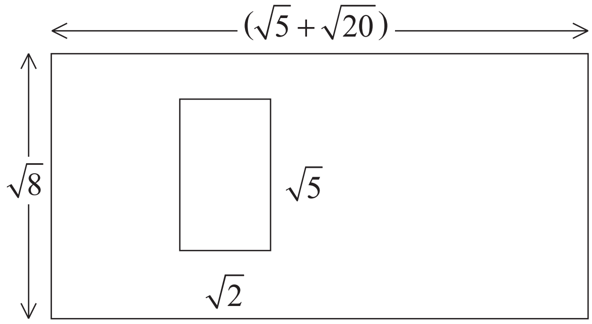

Diagram **NOT** accurately drawn

A large rectangular piece of card is $(\sqrt{5} + \sqrt{20})$ cm long and $\sqrt{8}$ cm wide.

A small rectangle $\sqrt{2}$ cm long and $\sqrt{5}$ cm wide is cut out of the piece of card.

(c) Express the area of the card that is left as a percentage of the area of the large rectangle.

%

....

(4)

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PLEASE TURN OVER FOR QUESTION 19

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19. (a) (i) Factorise $2x^2 - 35x + 98$

....

(ii) Solve the equation $2x^2 - 35x + 98 = 0$

....

(3)

A bag contains $(n + 7)$ tennis balls.
n of the balls are yellow.
The other 7 balls are white.

John will take at random a ball from the bag.
He will look at its colour and then put it back in the bag.

(b) (i) Write down an expression, in terms of n, for the probability that John will take a white ball.

....

Bill states that the probability that John will take a white ball is $\frac{2}{5}$

(ii) Prove that Bill's statement cannot be correct.

(3)

After John has put the ball back into the bag, Mary will then take at random a ball from the bag.
She will note its colour.

(c) Given that the probability that John and Mary will take balls with **different** colours is $\frac{4}{9}$,
prove that $2n^2 - 35n + 98 = 0$

(5)

(d) Using your answer to part (a) (ii) or otherwise, calculate the probability that John and Mary will both take white balls.

....
(2)

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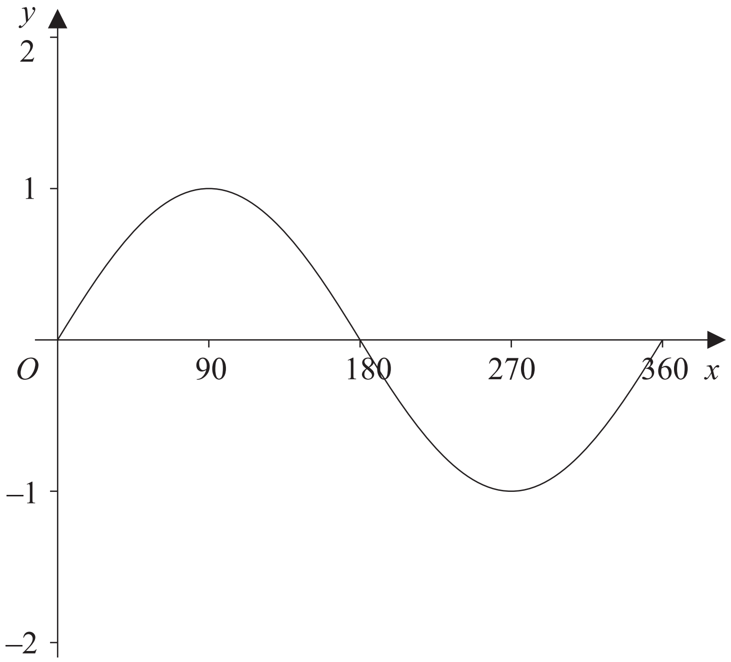
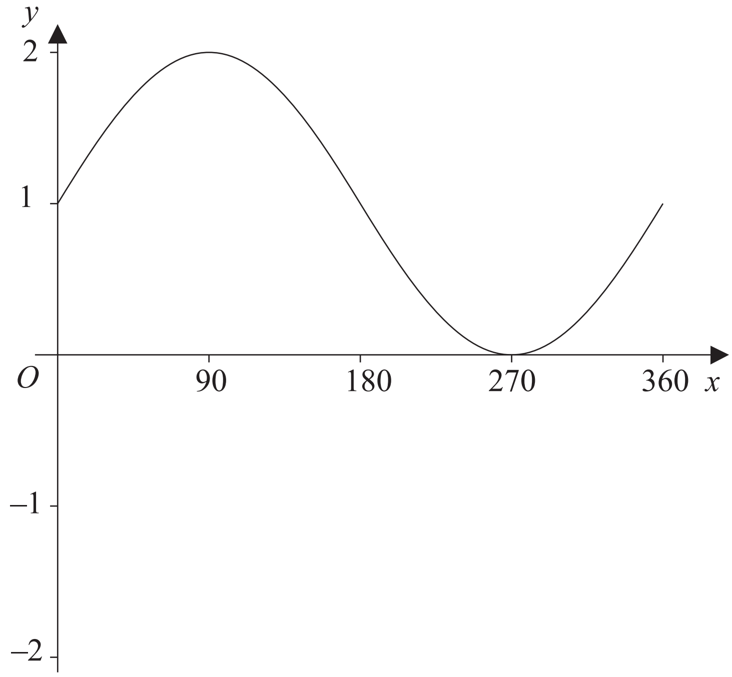
20. A sketch of the curve $y = \sin x°$ for $0 \leqslant x \leqslant 360$ is shown below.



(a) Using the sketch above, or otherwise, find the equation of each of the following two curves.

(i)



(i) Equation $y =$ ....

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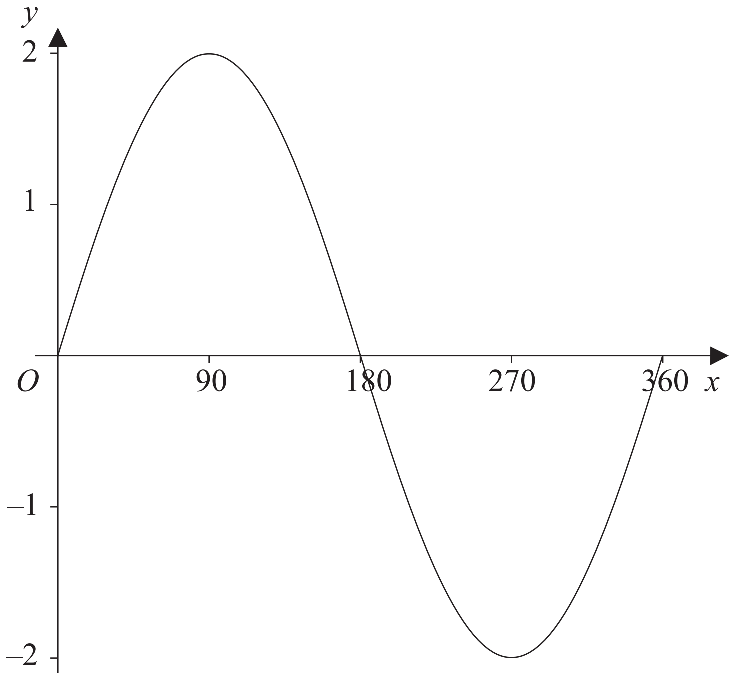
(ii)



(ii) Equation y = ...

(2)

(b) Describe fully the sequence of two transformations that maps the graph of $y = \sin x°$ onto the graph of $y = 3 \sin 2x°$.

....

....

....

....

(3)

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