Write your name here

Surname

Other names

Centre Number

Candidate Number

Edexcel GCSE

Mathematics A

Paper 1 (Non-Calculator)

Practice Papers Set D

Higher Tier - A*

Paper Reference

Time: 1 hour 45 minutes

1380 / 2381

You must have: Ruler graduated in centimetres and millimetres, protractor, pair of compasses, pen, HB pencil, eraser. Tracing paper may be used.

Total Marks

Instructions

- Use black ink or ball-point pen.
- Fill in the boxes at the top of this page with your name,
- centre number and candidate number.
- Answer all questions.
- Answer the questions in the spaces provided
  – there may be more space than you need.
- Calculators must not be used.

Information

- The total mark for this paper is 100
- The marks for each question are shown in brackets
  – use this as a guide as to how much time to spend on each question.
- Questions labelled with an asterisk (*) are ones where the quality of your written communication will be assessed.
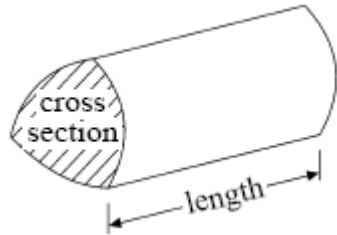
Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
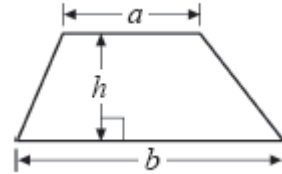- Check your answers if you have time at the end.

Formulae: Higher Tier

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

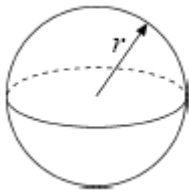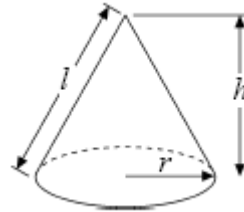**Volume of prism** = area of cross section × length

Area of trapezium = $\frac{1}{2}(a + b)h$

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
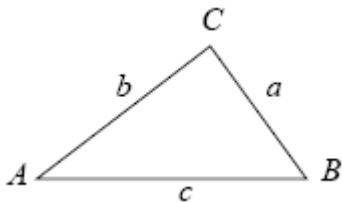
The Quadratic Equation
The solutions of $ax2 + bx + c = 0$
where $a \neq 0$, are given by

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

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 = $\frac{1}{2} ab \sin C$

2

1. The histogram gives information about the heights of 540 Christmas trees.
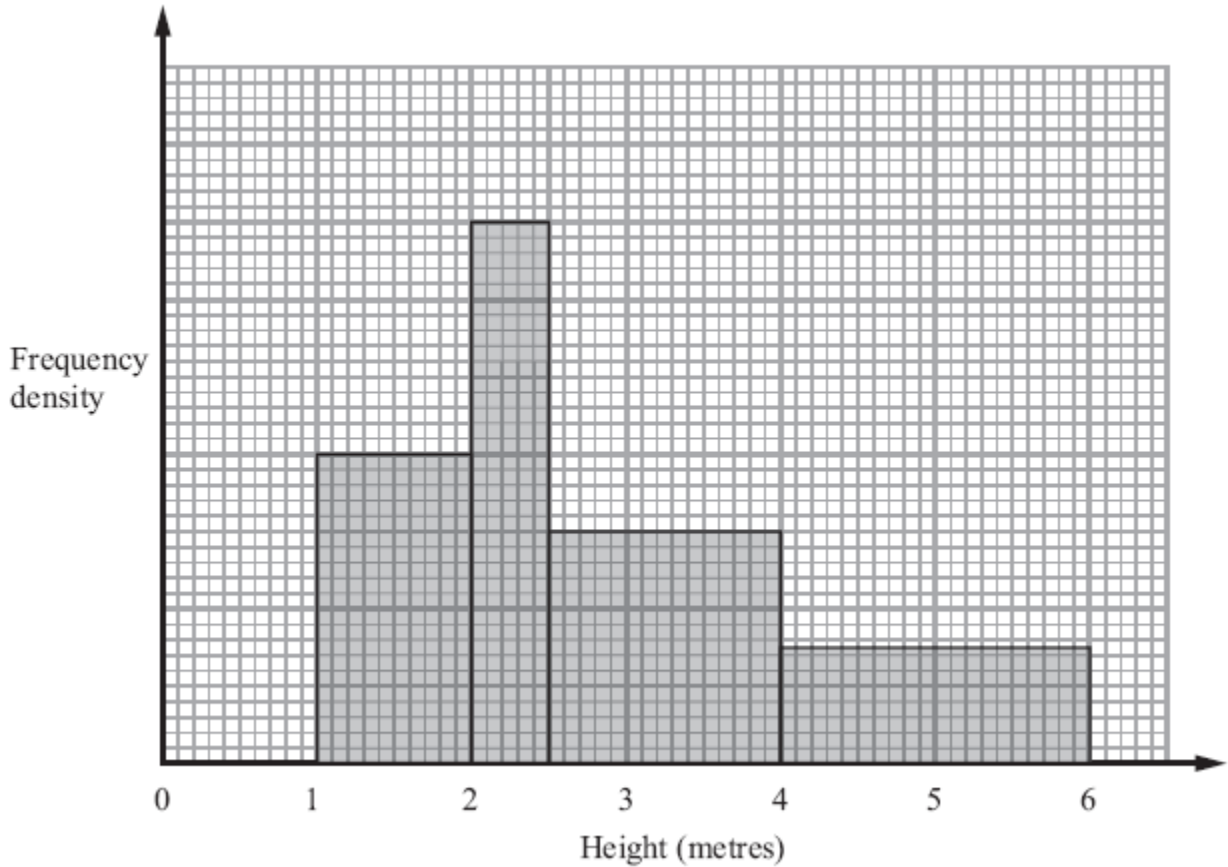
Work out an estimate for the number of Christmas trees with a height greater than 3 metres.

....

(Total 3 marks)

2.   *P* is inversely proportional to *V*.

When $V = 8$, $P = 5$

Calculate the value of *P* when $V = 2$

....

(Total 1 mark)

---

3.   Expand and simplify $(2 + \sqrt{2})(3 + \sqrt{8})$

Give your answer in the form $a + b\sqrt{2}$, where *a* and *b* are integers.

....

(Total 4 marks)

---

4. Solve the equation $\dfrac{x}{2} - \dfrac{2}{x+1} = 1$

....

(Total 4 marks)

5.

A

$(x + 4)$

x

Diagram **NOT**
accurately drawn

B $(x + 2)$ C
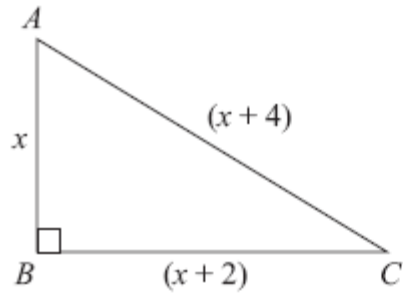
ABC is a right-angled triangle.
All the measurements are in centimetres.

$AB = x$
$BC = (x + 2)$
$AC = (x + 4)$

Show that $x^2 - 4x - 12 = 0$

(Total 3 marks)

---

6. Find the value of $\left(\dfrac{27}{8} \right)^{-\frac{2}{3}}$

....

(Total 2 marks)

7. Make k the subject of the formula $\quad t = \dfrac{k}{k-2}$

....

(Total 4 marks)

---

8. Change 125 cm^3 into mm^3.

.... mm^3

(Total 2 marks)

---

9. Jan has two boxes.
There are 6 black and 4 white counters in box A.
There are 7 black and 3 white counters in box B.

Jan takes at random a counter from box A and puts it in box B.
She then takes at random a counter from box B and puts it in box A.

Find the probability that after Jan has put the counter from box B into box A there will still be
6 black counters and 4 white counters in box A.

....
(Total 4 marks)

_____

10.
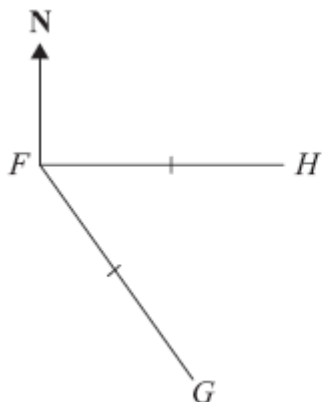
Diagram **NOT**
accurately drawn

F, *G* and *H* are 3 points.

FH = *FG*.

H is due East of *F*.

The bearing of *G* from *F* is 140°.

Work out the bearing of *G* from *H*.

065°   230°   205°   140°   155°

   A   B   C   D   E

(Total 1 mark)

---

11. $(3x + 2)^2 - (3x + 2)(x - 3) =$

$(3x + 2)(2x + 5)$ $6x^2 + 13x - 2$ $6x^2 + 13x + 10$ $10x - 2$ $(3x + 2)(2x - 1)$

   A   B   C   D   E

(Total 1 mark)

12.
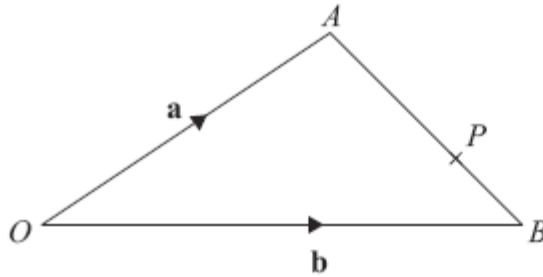
Diagram **NOT**
accurately drawn

OAB is a triangle.

OA = **a**, *OB* = **b**

P is the point on *AB* so that *AP* : *PB* = 2 : 1

Find the vector *OP* in terms of **a** and **b**.
Give your answer in its simplest form.

OP = ...

(Total 3 marks)

13.

Diagram **NOT**
accurately drawn
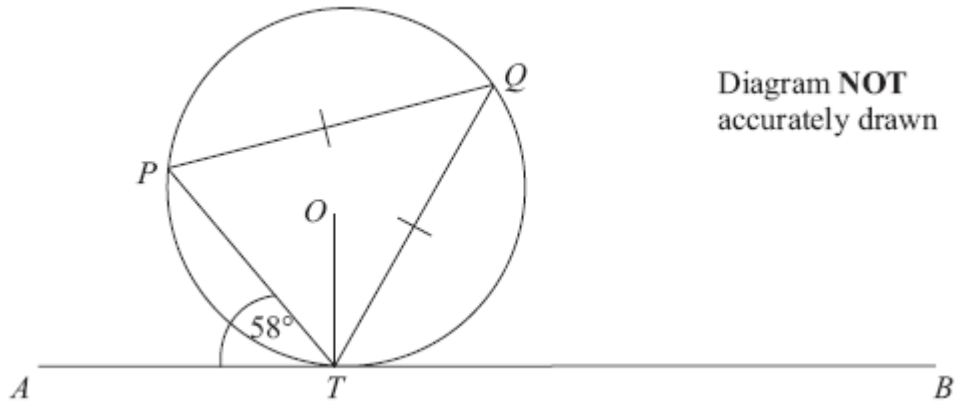
P, *Q* and *T* are points on the circumference of a circle, centre *O*.
The line *ATB* is the tangent at *T* to the circle.

PQ = *TQ*.
Angle *ATP* = 58°.

Calculate the size of angle *OTQ*.
Give a reason for each stage in your working.

.... °

(Total 5 marks)

14.
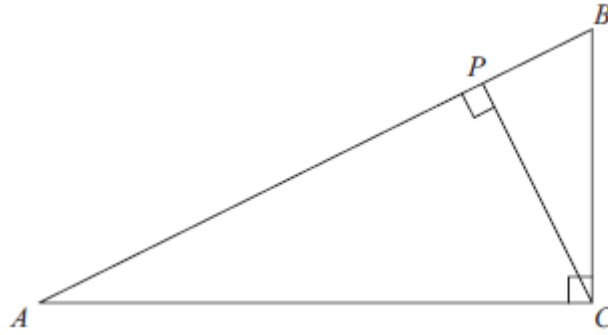
Diagram **NOT** accurately drawn

In the diagram,

ABC is a triangle,
angle *ACB* = 90°,
P lies on the line *AB*,
CP is perpendicular to *AB*.

Prove that the angles of triangle *APC* are the same as the angles of triangle *CPB*.

(Total 3 marks)

15. Callum says

"4 m^2 is equivalent to 400 cm^2."

Is Callum correct?
Give reasons for your answer.

....

....

....

(Total 2 marks)

16.
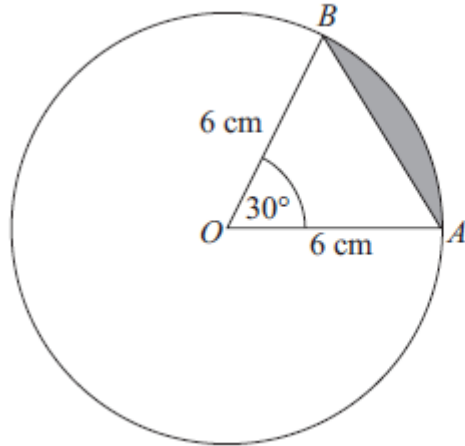
The diagram shows a circle, centre *O*.
A and *B* are points on the circle.
OA = *OB* = 6 cm.

The value of $\sin 30° = \dfrac{1}{2}$

Work out the area of the shaded segment.
Give your answer in terms of π.

.... cm^2

(Total 4 marks)

17.
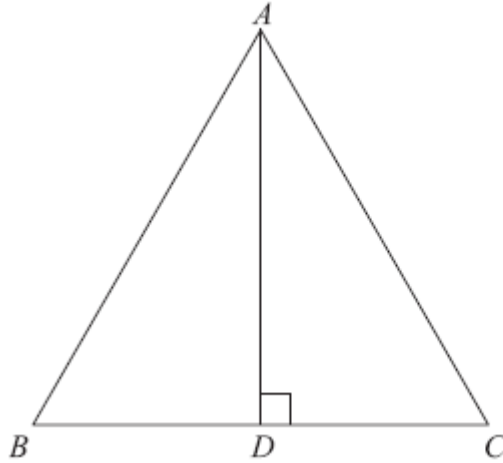
Diagram **NOT** accurately drawn

ABC is an equilateral triangle.
D lies on *BC*.
AD is perpendicular to *BC*.

(a) Prove that triangle *ADC* is congruent to triangle *ADB*.

(3)

(b) Hence, prove that $BD = \dfrac{1}{2}AB$.

(2)

(Total 5 marks)

18.
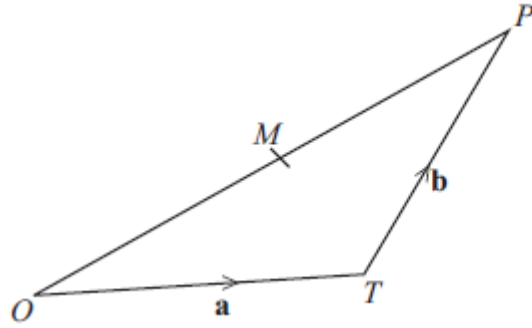
Diagram **NOT** accurately drawn

OPT is a triangle.
M is the midpoint of *OP*.

$\overrightarrow{OT} = \mathbf{a}$

$\overrightarrow{TP} = \mathbf{b}$

Express $\overrightarrow{TM}$ in terms of **a** and **b**.
Give your answer in its simplest form.

$\overrightarrow{TM} =$ ....

(Total 2 marks)

19. Factorise completely $4x^2 - 100y^2$

$(2x + 10y)(2x - 10y)$ $2(x + 5y)(x - 5y)$ $4(x + 5y)(x - 5y)$

A   **B**   **C**

$(2x - 10y)(2x - 10y)$ $4(x - 5y)(x - 5y)$

D   **E**

(Total 1 mark)

---

20. Solve $2x^2 - 9x + 4 = (2x - 1)^2$

....

(Total 4 marks)

21. Prove, using algebra, that the sum of two consecutive whole numbers is always an odd number.

(Total 3 marks)

---

22. Given that $\dfrac{8 - \sqrt{18}}{\sqrt{2}} = a + b\sqrt{2}$, where a and b are integers,

find the value of a and the value of b.

$a = $ ....

$b = $ ....

(Total 3 marks)

18

23.

Diagram **NOT** accurately drawn
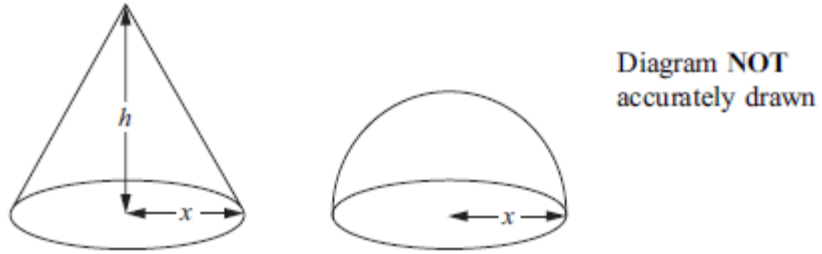
The diagram shows a solid cone and a solid hemisphere.

The cone has a base of radius x cm and a height of h cm.
The hemisphere has a base of radius x cm.
The surface area of the cone is equal to the surface area of the hemisphere.

Find an expression for h in terms of x.

....

(Total 4 marks)

24. Mark says

'8 cm^3 multiplied by 100 equals 8 m^3'.

Is Mark right?
Give reasons for your answer.

....

....

....

....
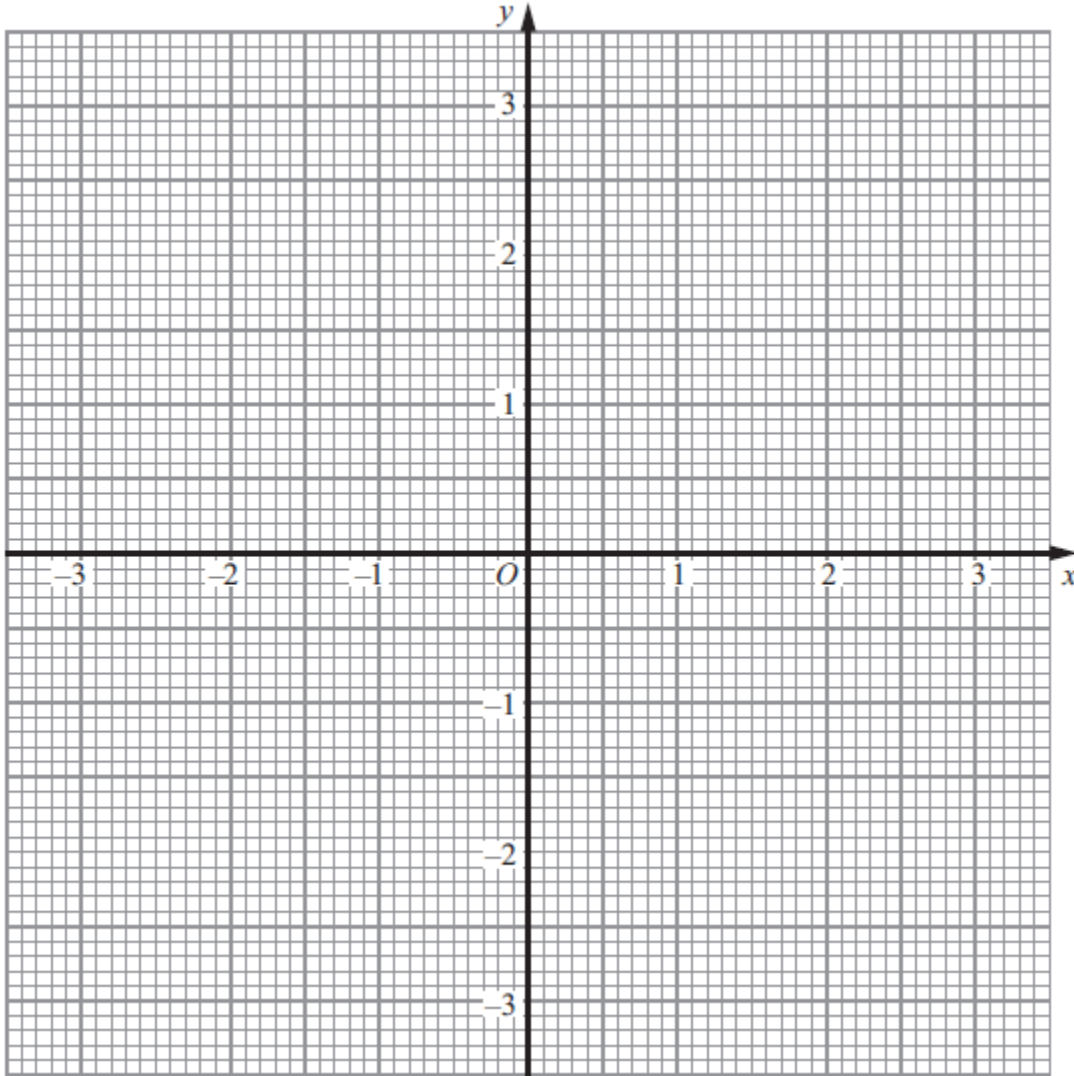
(Total 2 marks)

25. Construct the graph of $x^2 + y^2 = 9$

(Total 2 marks)

26.
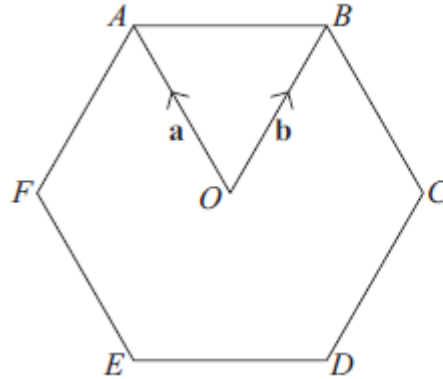
Diagram **NOT**
accurately drawn

ABCDEF is a regular hexagon, with centre *O*.

$\overrightarrow{OA} = \mathbf{a}$, $\overrightarrow{OB} = \mathbf{b}$.

The line *AB* is extended to the point *K* so that *AB* : *BK* = 1 : 2

Write the vector $\overrightarrow{CK}$ in terms of **a** and **b**.
Give your answer in its simplest form.

....

(Total 3 marks)

27.
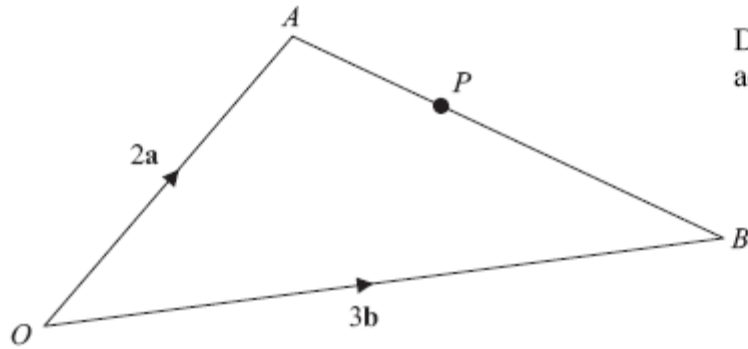
Diagram **NOT** accurately drawn

OAB is a triangle.

$\overrightarrow{OA} = 2\mathbf{a}$

$\overrightarrow{OB} = 3\mathbf{b}$

P is the point on *AB* such that *AP* : *PB* = 2 : 3

Show that $\overrightarrow{OP}$ is parallel to the vector $\mathbf{a} + \mathbf{b}$.
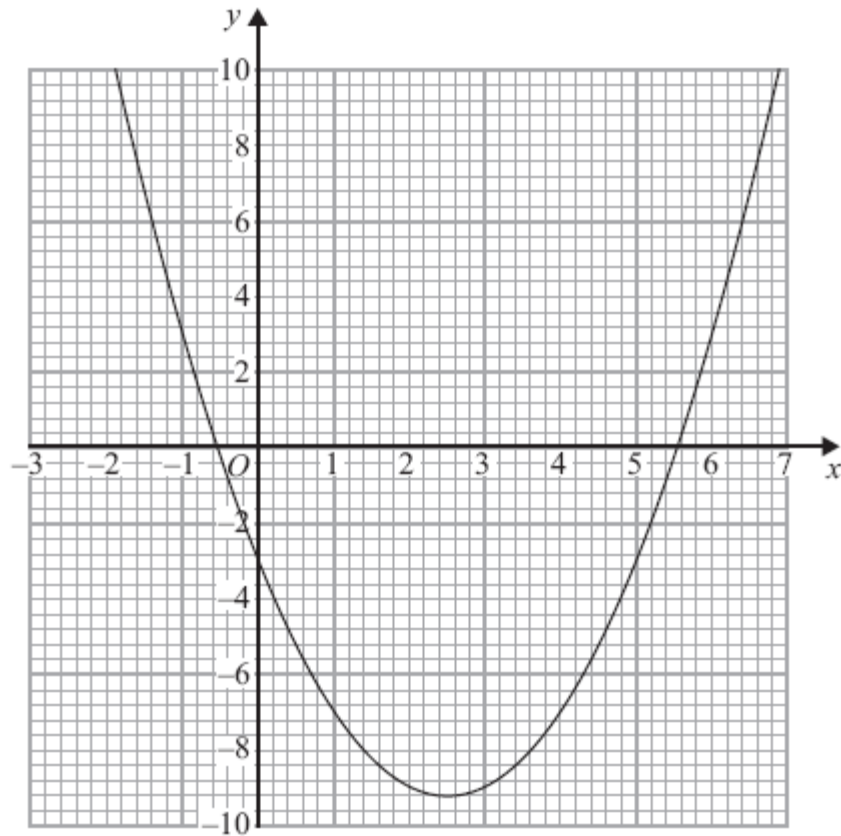
(Total 3 marks)

28. Rearrange $\dfrac{1}{u} + \dfrac{1}{v} = \dfrac{1}{f}$

to make u the subject of the formula.

Give your answer in its simplest form.

....

(Total 2 marks)

29. The diagram shows the graph of $y = x^2 - 5x - 3$

(a) Use the graph to find estimates for the solutions of

(i) $x^2 - 5x - 3 = 0$

....

(ii) $x^2 - 5x - 3 = 6$

....

(3)

(b) Use the graph to find estimates for the solutions of the simultaneous equations

$$y = x^2 - 5x - 3$$

$$y = x - 4$$

....
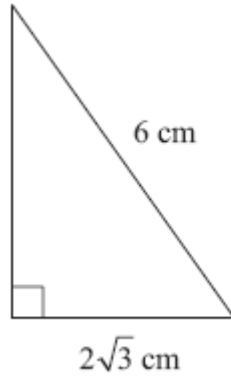
(3)

(Total 6 marks)

30.

Diagram **NOT** accurately drawn

The diagram shows a right-angled triangle.

The length of the base of the triangle is $2\sqrt{3}$ cm.

The length of the hypotenuse of the triangle is 6 cm.

The area of the triangle is A cm^2.

Show that $A = k \sqrt{2}$ giving the value of k.

....

(Total 5 marks)

31. Here are two right-angled triangles.
All the measurements are in centimetres.

Diagrams **NOT** accurately drawn
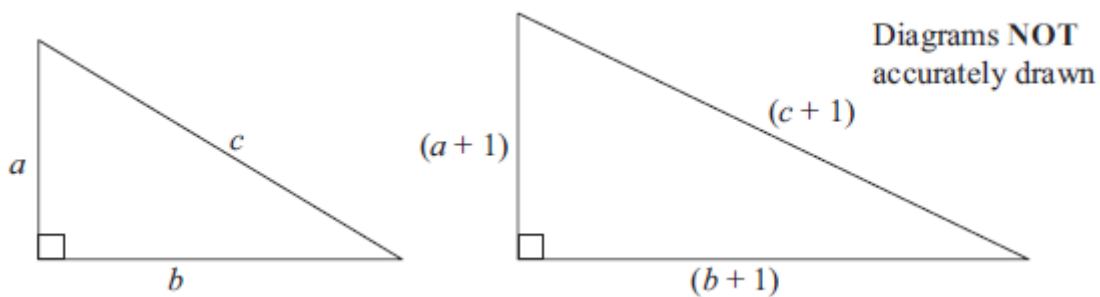
(a) Show that $2a + 2b + 1 = 2c$

(3)

a, b and c cannot all be integers.

(b) Explain why.

(1)

(Total 4 marks)

32. Here is a shape *ABCDE*.
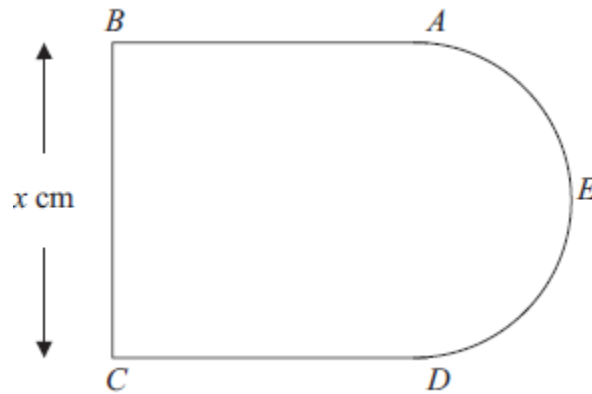
Diagram **NOT**
accurately drawn

AB, *BC* and *CD* are three sides of a square.
BC = *x* cm.
AED is a semicircle with diameter *AD*.

The perimeter, *P* cm, of the shape *ABCDE* is given by the formula

$$P = 3x + \frac{\pi x}{2}$$

(a) Rearrange this formula to make *x* the subject.

....

(2)

The area, A cm^2, of this shape is given by $A = kx^2$ where k is a constant.

(b) Find the exact value of k.
      Give your answer in its simplest form.

....
(3)

(Total 5 marks)

TOTAL FOR PAPER IS 100 MARKS

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New Question	Question	Paper	Skill tested	Mean score	Maximum score	Mean Percent
1	Q06	1203 6B	Use histograms to complete a frequency table	0.45	3	15
2	Q26b	1011 1H	Solve problems using inverse proportion	0.14	1	14
3	Q22	1203 1H	Use surds in calculations	0.56	4	14
4	Q18	1106 13H	Solve fractional equations	0.56	4	14
5	Q25a	1006 1H	Derive an equation from diagrams	0.39	3	13
6	Q16iii	1006 13H	Work out and simplify expressions with negative and fractional indices	0.24	2	12
7	Q15	1106 13H	Change the subject of the formula	0.49	4	12
8	Q09b	0911 1H	Convert between units of volume	0.24	2	12
9	Q22b	1111 3H	Use tree diagrams to find probability when two or more outcomes can happen	0.46	4	12
10	Q14	1111 8H	Calculate a bearing	0.12	1	12
11	Q24	1203 8H	Expand and simplify (px + a)(qx + b)	0.12	1	12
12	Q22b	0911 3H	Use vectors to solve geometric configurations	0.32	3	11
13	Q18	1006 13H	Solve geometric configurations using circle theorems of chord and tangents	0.55	5	11
14	Q17	1106 1H	Prove that two triangles are similar triangles	0.32	3	11
15	Q07	1106 13H	Convert between metric units	0.21	2	11
16	Q13	1111 13H	Find the area of a segment	0.42	4	11
17a	Q24a	0906 3H	Find the conditions in order to prove that two triangles are congruent	0.29	3	10
17b	Q24b	0906 3H	Find the conditions in order to prove that two triangles are congruent	0.24	2	12
18	Q27b	1011 1H	Use vectors to solve geometric configurations	0.20	2	10
19	Q20	1106 8H	Factorise using the difference of two squares	0.10	1	10
20	Q20b	1111 3H	Solve problems using quadratic equations	0.39	4	10
21	Q25	0911 1H	Use algebra to perform proofs	0.28	3	9
22	Q22b	1106 1H	Use surds in calculations	0.27	3	9
23	Q25	1106 1H	Find the volume and surface area of a variety of complex shapes	0.35	4	9
24	Q06	1203 13H	Convert between metric units	0.17	2	9
25	Q28a	1011 1H	Solve the equation of a circle with a straight line graphically	0.16	2	8
26	Q23b	1203 1H	Use vectors to solve geometric configurations	0.25	3	8
27	Q26b	1106 1H	Use vectors to solve geometric configurations	0.21	3	7
28	Q25b	0906 3H	Change the subject of the formula	0.12	2	6
29ai	Q14ai	1111 3H	Solve quadratic equations graphically	0.11	1	11
29aii	Q14aii	1111 3H	Solve quadratic equations graphically	0.27	2	14
29b	Q14b	1111 3H	Solve simultaneous linear and quadratic equations graphically	0.19	3	6
30	Q21	1111 3H	Use surds in calculations	0.28	5	6
31a	Q24b	1203 1H	Use Pythagoras' theorem in unstructured situations	0.16	3	5
31b	Q24c	1203 1H	Use Pythagoras' theorem in unstructured situations	0.01	1	1
32a	Q16a	1203 13H	Change the subject of the formula	0.11	2	6
32b	Q16b	1203 13H	Find the area and perimeter of compound shapes	0.02	3	1
			TOTAL	**9.77**	**100**	