

Centre No.						Paper Reference						Surname	Initial(s)		
Candidate No.						5	5	4	0	H	/	3	H	Signature	

Paper Reference(s)

**5540H/3H****Edexcel GCSE****Mathematics A (Linear) – 2540****Paper 3 (Non-Calculator)****Higher Tier****Monday 19 May 2008 – Morning****Time: 1 hour 45 minutes**

Examiner's use only

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Team Leader's use only

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**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.

Check that you have the correct question paper.

Answer ALL the questions. Write your answers in the spaces provided in this question paper.

**You must NOT write on the formulae page.**

**Anything you write on the formulae page will gain NO credit.**

If you need more space to complete your answer to any question, use additional answer sheets.

**Information for Candidates**

The marks for individual questions and the parts of questions are shown in round brackets: e.g. (2).

There are 28 questions in this question paper. The total mark for this paper is 100.

There are 24 pages in this question paper. Any blank pages are indicated.

**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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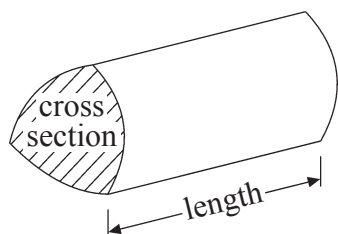
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## GCSE Mathematics (Linear) 2540

Formulae: Higher Tier

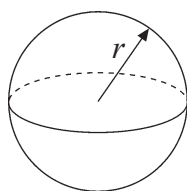
**You must not write on this formulae page.  
Anything you write on this formulae page will gain NO credit.**

**Volume of a prism** = area of cross section  $\times$  length



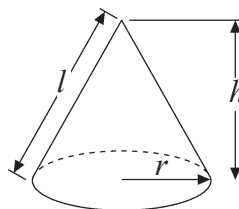
**Volume of sphere** =  $\frac{4}{3}\pi r^3$

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

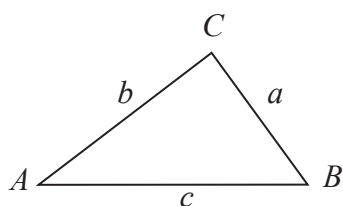


**Volume of cone** =  $\frac{1}{3}\pi r^2 h$

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



**In any triangle ABC**



**The Quadratic Equation**

The solutions of  $ax^2 + bx + c = 0$

where  $a \neq 0$ , are given by

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

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

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

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



Answer ALL TWENTY EIGHT questions.

Write your answers in the spaces provided.

You must write down all stages in your working.

You must NOT use a calculator.

1. Here are the ingredients needed to make 8 pancakes.

<p><b>Pancakes</b>                  Ingredients to make 8 pancakes</p> <p>300 ml milk                  1 egg                  120 g flour                  5 g butter</p>
---

Jacob makes 24 pancakes.

(a) Work out how much milk he needs.

300ml makes 8 pancakes  
 so  $300 \times 3 = 900$ ml  
 makes 24 pancakes

..... 900 ..... ml  
 (2)

2

Cathie makes 12 pancakes.

(b) Work out how much flour she needs.

$8 \times 1\frac{1}{2} = 12$   
 $120g \times 1\frac{1}{2} = 180g$

..... 180 ..... g  
 (2)

2

Q1

(Total 4 marks)

4



Leave blank

2. Kaysha has a part-time job. She is paid £5.40 for each hour she works. Last week Kaysha worked for 24 hours.

Work out Kaysha's total pay for last week.

x	500	40	
20	10000	800	= 10800
4	2000	160	= 2160
		<hr/>	
		129.60	£ 129.60 ✓

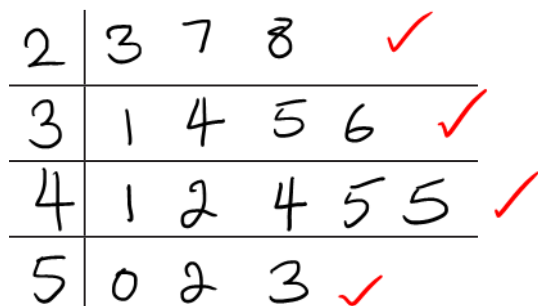
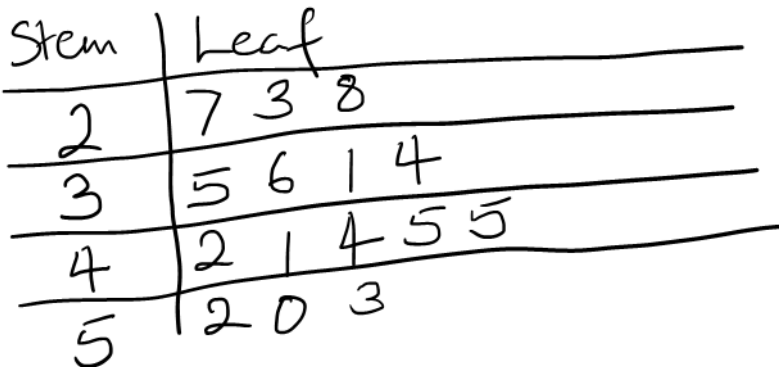
(Total 3 marks)

Q2  
3

3. Here are the ages, in years, of 15 teachers.

~~25~~ ~~52~~ ~~42~~ ~~27~~ ~~38~~  
~~23~~ ~~31~~ ~~41~~ ~~50~~ ~~34~~  
~~44~~ ~~28~~ ~~45~~ ~~45~~ ~~53~~

Draw an ordered stem and leaf diagram to show this information. You must include a key.



Key:  
2|7 = 27 ✓

(Total 3 marks)

Q3  
3



Leave blank

4. Using the information that

$$4.8 \times 34 = 163.2$$

write down the value of

(a)  $48 \times 34 = 1632$

$\nearrow$   
10x more                       $\uparrow$   
10x more

..... 1632 .....  
(1)

(b)  $4.8 \times 3.4 = 16.32$

$\uparrow$                        $\uparrow$   
10x less                      10x less

..... 16.32 .....  
(1)

(c)  $163.2 \div 48 = 3.4$   $\leftarrow$  10x less

$163.2 \div 4.8 = 34$   
 $\uparrow$   
10x less

..... 3.4 .....  
(1)

(Total 3 marks)

Q4  
3

5.

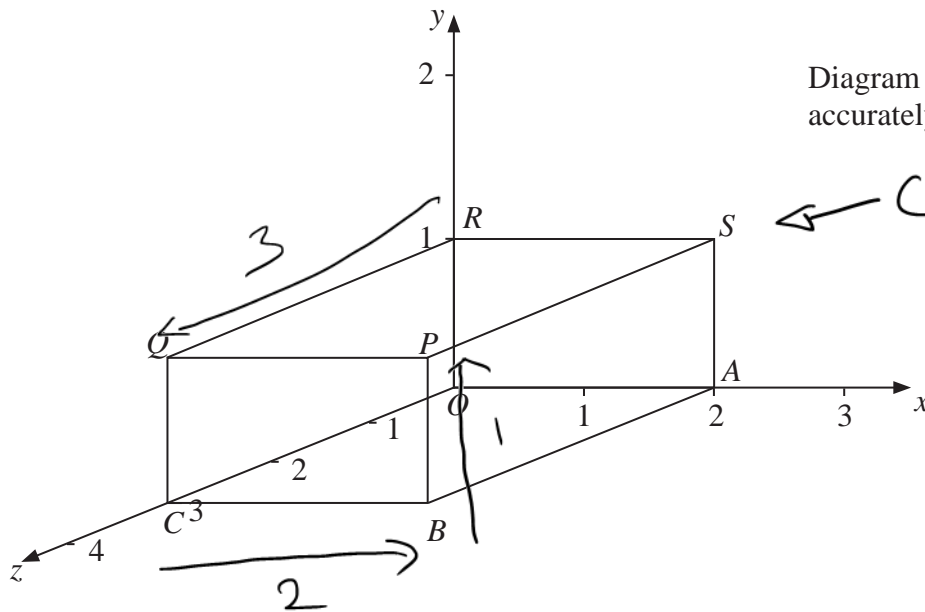


Diagram NOT accurately drawn

$\leftarrow$  (2, 1, 0)

A cuboid is shown on a 3-dimensional grid.

(a) Write down the letter of the point with coordinates (2, 1, 0).

..... S .....  
(1)

(b) Write down the coordinates of the point P.

(....., ....., .....)  
(2, 1, 3)  
(1)

(Total 2 marks)

Q5  
2



6. This rule is used to work out the total cost, in pounds, of hiring a carpet cleaner.

Multiply the number of days' hire by 4

Add 6 to your answer

Peter hires a carpet cleaner.  
The total cost is £18

- (a) Work out for how many days he hires the carpet cleaner.

$$18 - 6 = 12$$

$$12 \div 4 = 3 \text{ days}$$

..... 3 ✓ days  
(2)

2

- (b) Write down an expression, in terms of  $n$ , for the total cost, in pounds, of hiring a carpet cleaner for  $n$  days.

$$\text{Cost} = 4n + 6$$

.....  $4n + 6$  ✓  
(2)

2

Q6

(Total 4 marks)

4



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7.

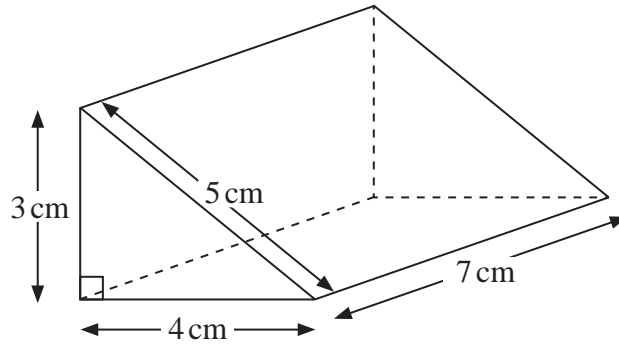


Diagram NOT accurately drawn

Work out the total surface area of the triangular prism.  
Give the units with your answer.

$$\begin{aligned} \text{Area } \Delta &= \frac{1}{2}bh \\ &= \frac{1}{2} \times 4 \times 3 \\ &= 6\text{cm}^2 \end{aligned}$$

$$\begin{aligned} \text{Rectangle 1} &= 5 \times 7 = 35\text{cm}^2 \\ \text{Rectangle 2} &= 4 \times 7 = 28\text{cm}^2 \\ \text{Rectangle 3} &= 3 \times 7 = 21\text{cm}^2 \end{aligned}$$

Total Surface Area

$$\begin{array}{r} 6 \\ 6 \\ 35 \\ 28 \\ 21 \\ \hline 96\text{cm}^2 \end{array}$$

↔ 2 triangles

(Total 4 marks)

Q7

4



Leave blank

8. Work out an estimate for  $\frac{302 \times 9.96}{0.51}$

Round each number to 1sf.

$$\frac{300 \times 10}{0.5} = \frac{3000}{0.5} = 6000$$

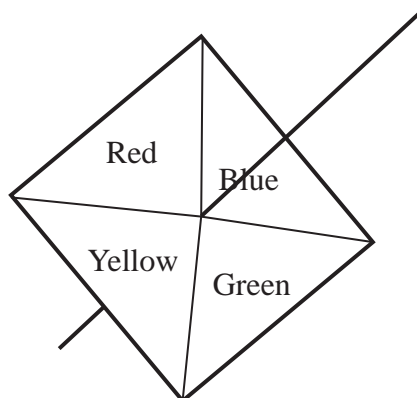
6000

(Total 3 marks)

Q8

3

9. Here is a 4-sided spinner.



$$\begin{array}{r} 0.2 \\ 0.3 \\ 0.1 \\ \hline 0.6 \end{array}$$

$$1 - 0.6 = 0.4$$

The sides of the spinner are labelled Red, Blue, Green and Yellow.

The spinner is biased.

The table shows the probability that the spinner will land on each of the colours Red, Yellow and Green.

Colour	Red	Blue	Green	Yellow
Probability	0.2	0.4	0.3	0.1

Work out the probability the spinner will land on Blue.

0.4

(Total 2 marks)

Q9

2





Leave  
blank

10. (a) Simplify  $4p \times 5q = 4 \times 5 \times p \times q$

$$\underline{20pq} \quad \checkmark$$

(1)

(b) Simplify  $d \times d \times d \times d = d^4$

$$\underline{d^4} \quad \checkmark$$

(1)

(c) Expand  $4(3a - 7)$

$$4(3a - 7) = 12a - 28$$

*(Handwritten arrows showing distribution of 4 to 3a and -7)*

$$\underline{12a - 28} \quad \checkmark$$

(2)

(d) Expand and simplify  $2(2n + 3) + 3(n + 1)$

$$\begin{aligned} & 2(2n + 3) + 3(n + 1) \\ &= 4n + 6 + 3n + 3 \\ &= 4n + 3n + 6 + 3 = \end{aligned}$$

$$\underline{7n + 9} \quad \checkmark$$

(2)

(e) Simplify  $t \times t^2 = t \times t \times t = t^3$

$$\underline{t^3} \quad \checkmark$$

(1)

(f) Simplify  $m^5 \div m^3$

$$= m^{5-3} = m^2$$

$$\underline{m^2} \quad \checkmark$$

(1)

(Total 8 marks)

Q10

8



N 3 0 9 9 2 A 0 9 2 4

Leave  
blank

11. In the space below, use ruler and compasses to **construct** an equilateral triangle with sides of length 6 centimetres.

You must show all your construction lines.

One side of the triangle has already been drawn for you.



(Total 2 marks)

Q11

12.  $-2 \leq x < 3$   
 $x$  is an integer.

Write down all the possible values of  $x$ .

$x$  is greater than OR equal to  $-2$   
and  $x$  is less than  $3$        $-2, -1, 0, 1, 2$  ✓

(Total 2 marks)

Q12



13. (a) Write down the reciprocal of 4

$$\frac{1}{4} \quad \checkmark$$

.....

(1)

(b) Work out the value of  $2\frac{4}{5} - 1\frac{3}{4}$

Give your answer as a fraction in its simplest form.

Step 1: change mixed numbers into top heavy fractions

$$2\frac{4}{5} = \frac{14}{5} \quad 1\frac{3}{4} = \frac{7}{4}$$

Step 2: find the common DENOMINATOR

5, 10, 15, 20

4, 8, 12, 16, 20

$$\frac{14}{5} - \frac{7}{4} = \frac{56}{20} - \frac{35}{20} = \frac{21}{20} = 1\frac{1}{20}$$

.....

(3)

(c) Sundas says that  $4\frac{1}{3}$  is equal to 4.3

Sundas is **wrong**.

Explain why.

$\frac{1}{3}$  is  $0.\dot{3}$  not 0.3 ✓

.....

4.3 is  $4\frac{3}{10}$

.....

(1)

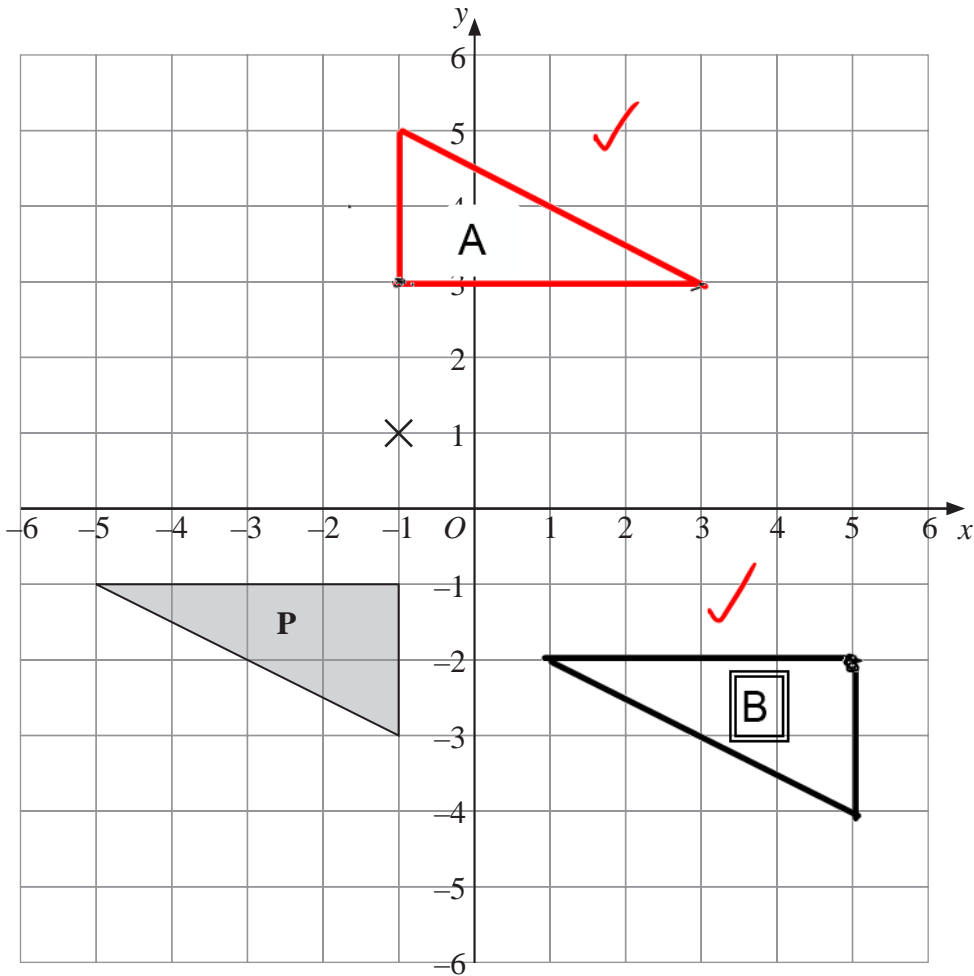
(Total 5 marks)

Q13

5



14.



(a) Rotate triangle **P**  $180^\circ$  about the point  $(-1, 1)$ .

Label the new triangle **A**.

(2)

2

(b) Translate triangle **P** by the vector  $\begin{pmatrix} 6 \\ -1 \end{pmatrix}$ .

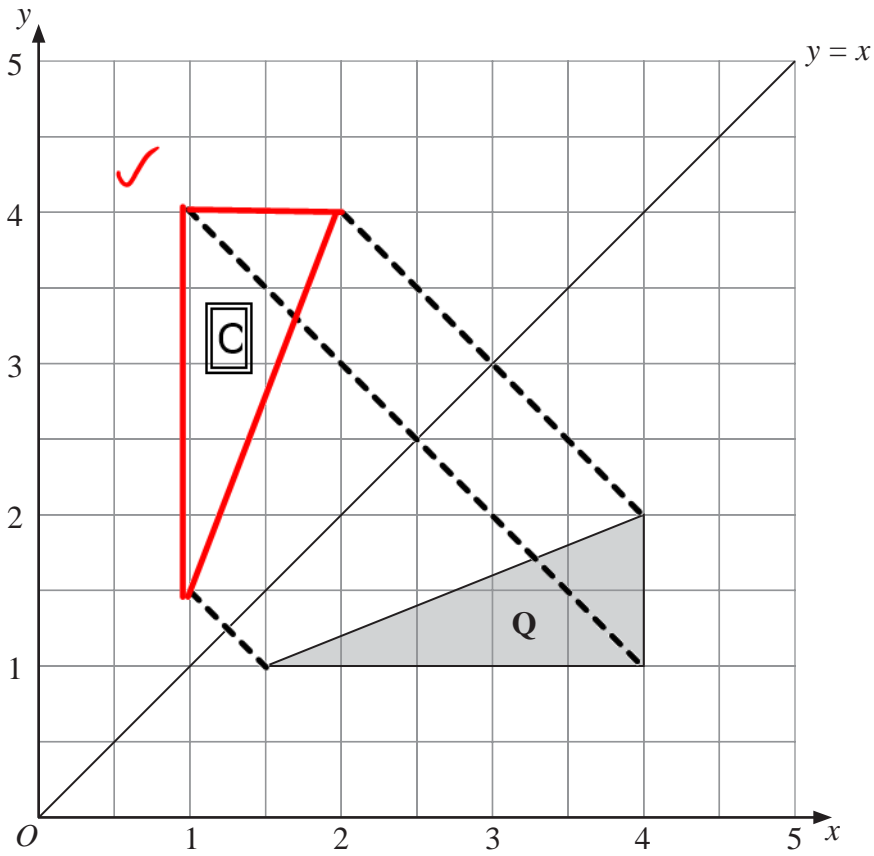
Label the new triangle **B**.

(1)

1



Leave blank



(c) Reflect triangle **Q** in the line  $y = x$ .

Label the new triangle **C**.

(2)

2

Q14

(Total 5 marks)

5



Leave blank

15. (a) Expand  $x(3x - 5y)$

$$x(3x - 5y) = 3x^2 - 5xy$$

$$\underline{3x^2 - 5xy} \quad (2)$$

2

(b) Factorise  $x^2 - 36$

These are both square numbers so this is a DIFFERENCE OF TWO SQUARES  
Factorisation

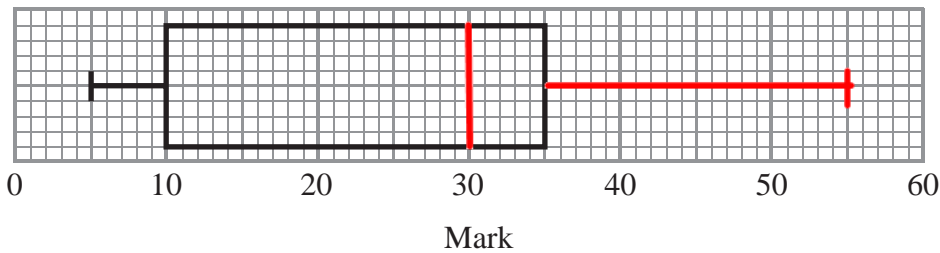
$$\underline{(x+6)(x-6)} \quad (1)$$

1  
Q15

3

(Total 3 marks)

16. The incomplete box plot and table show some information about some marks.



	Mark
Lowest mark	5
Lower quartile	10
Median	30
Upper quartile	35
Highest mark	55

(a) Use the information in the table to complete the box plot.

(2)

2

(b) Use the information in the box plot to complete the table.

(1)

1

Q16

3

(Total 3 marks)



Leave  
blank17. (a) Write  $6.4 \times 10^4$  as an ordinary number.

6.4 0 0 0

64,000

(1)

(b) Write 0.0039 in standard form.

0.0039 =

 $3.9 \times 10^{-3}$ 

(1)

(c) Write  $0.25 \times 10^7$  in standard form.

This isn't in STANDARD form because the first number has to be between 1 and less than 10

$$0.25 \times 10^7 = 2.5 \times 10^6$$

$\uparrow$        $\uparrow$

(1)

(Total 3 marks)

Q17

3

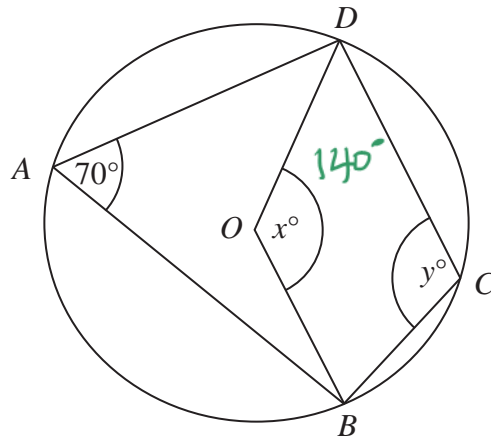
10 x more      10 x less



N 3 0 9 9 2 A 0 1 5 2 4

18.

Diagram **NOT** accurately drawn



In the diagram,  $A, B, C$  and  $D$  are points on the circumference of a circle, centre  $O$ .  
 Angle  $BAD = 70^\circ$ .  
 Angle  $BOD = x^\circ$ .  
 Angle  $BCD = y^\circ$ .

(a) (i) Work out the value of  $x$ .

$x = \dots 140^\circ \checkmark$

(ii) Give a reason for your answer.

Angle at the centre is twice the angle at the circumference  $\checkmark$

(2)

(b) (i) Work out the value of  $y$ .

$y = \dots 110^\circ \checkmark$

(ii) Give a reason for your answer.

.....  
 .....

(2)

(Total 4 marks)

Q18





Leave  
blank

19. Solve the simultaneous equations.

$$2x + 3y = 0$$

$$x - 3y = 9$$

$x = \dots\dots\dots$  ,  $y = \dots\dots\dots$

**(Total 3 marks)**

Q19



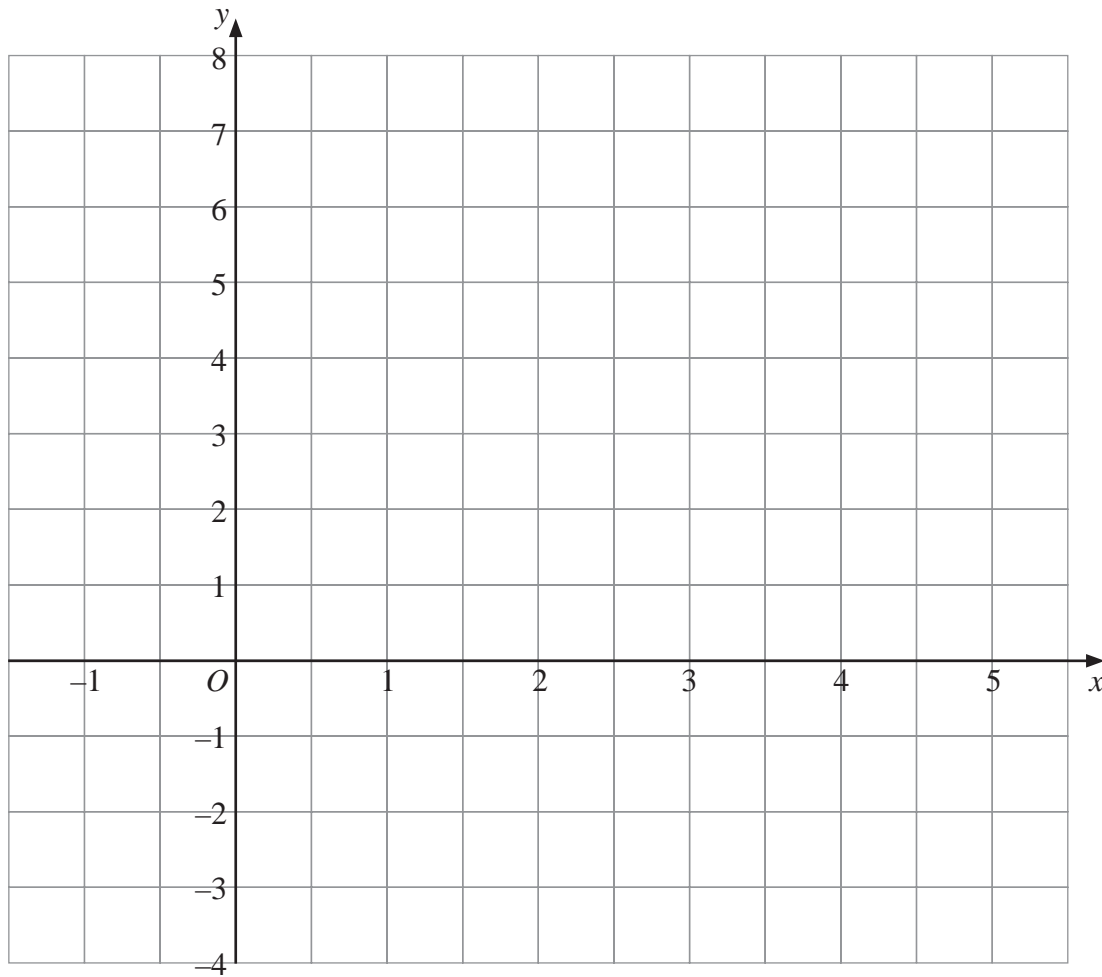
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20. (a) Complete the table of values for  $y = x^2 - 4x + 2$

$x$	-1	0	1	2	3	4	5
$y$		2	-1		-1		7

(2)

(b) On the grid, draw the graph of  $y = x^2 - 4x + 2$



(2)

Q20

(Total 4 marks)

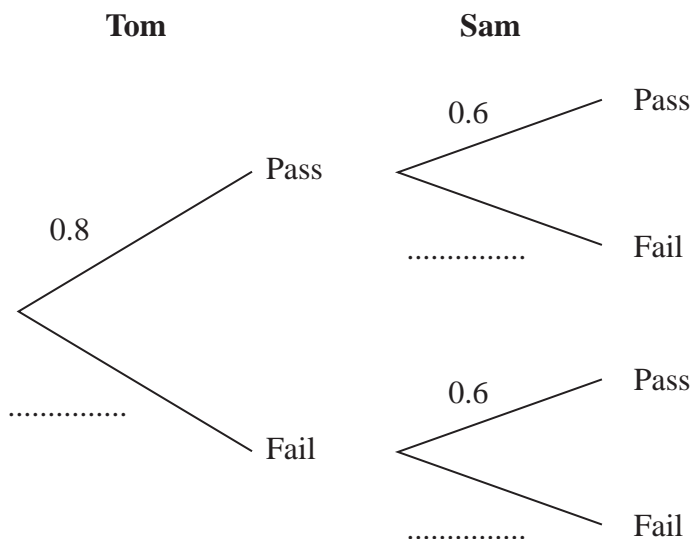


**21.** Tom and Sam each take a driving test.

The probability that Tom will pass the driving test is 0.8

The probability that Sam will pass the driving test is 0.6

(a) Complete the probability tree diagram.



(2)

(b) Work out the probability that both Tom and Sam will pass the driving test.

.....  
(2)

(c) Work out the probability that only one of them will pass the driving test.

.....  
(3)

(Total 7 marks)

Q21



Leave  
blank

22. Make  $b$  the subject of the formula  $a = \frac{2-7b}{b-5}$

.....

**(Total 4 marks)****Q22**

23. (a) Rationalise the denominator of  $\frac{1}{\sqrt{3}}$

.....

**(1)**

(b) Expand  $(2+\sqrt{3})(1+\sqrt{3})$

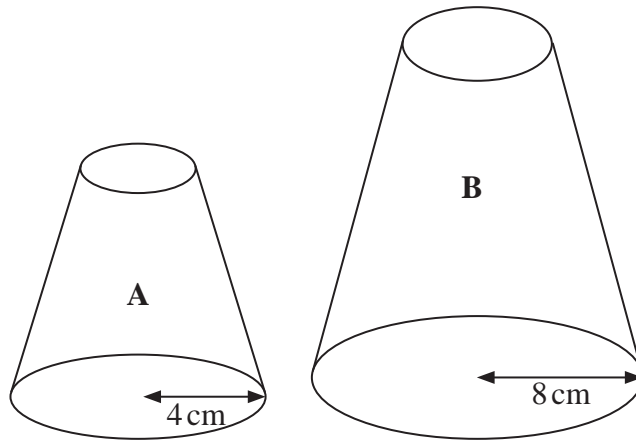
Give your answer in the form  $a+b\sqrt{3}$ , where  $a$  and  $b$  are integers.

.....

**(2)****(Total 3 marks)****Q23**

24.

Diagrams **NOT** accurately drawn



Two solid shapes, **A** and **B**, are mathematically similar.  
 The base of shape **A** is a circle with radius 4 cm.  
 The base of shape **B** is a circle with radius 8 cm.

The surface area of shape **A** is  $80 \text{ cm}^2$ .

(a) Work out the surface area of shape **B**.

.....  $\text{cm}^2$   
 (2)

The volume of shape **B** is  $600 \text{ cm}^3$ .

(b) Work out the volume of shape **A**.

.....  $\text{cm}^3$   
 (2)

(Total 4 marks)

Q24



25.

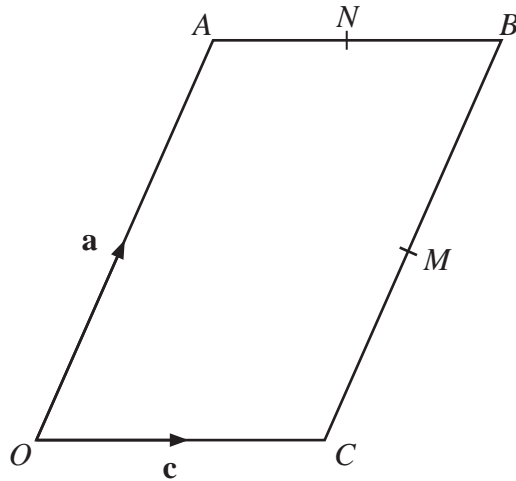


Diagram **NOT** accurately drawn

$OACB$  is a parallelogram.  
 $M$  is the midpoint of  $CB$ .  
 $N$  is the midpoint of  $AB$ .

$$\vec{OA} = \mathbf{a}$$

$$\vec{OC} = \mathbf{c}$$

(a) Find, in terms of  $\mathbf{a}$  and/or  $\mathbf{c}$ , the vectors

(i)  $\vec{MB}$ ,

.....

(ii)  $\vec{MN}$ .

.....

(2)

(b) Show that  $CA$  is parallel to  $MN$ .

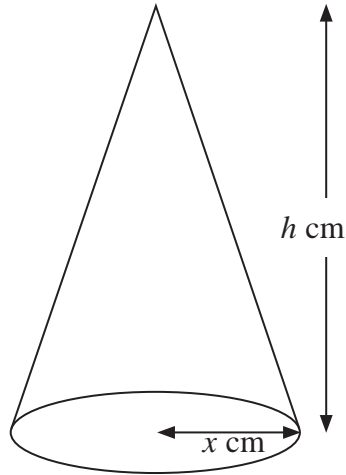
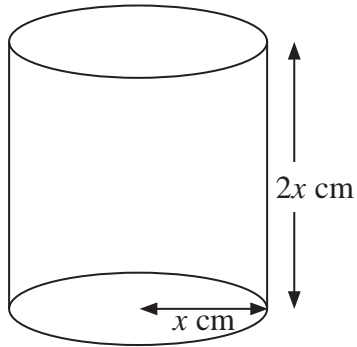
(2)

Q25

(Total 4 marks)



26.

Diagrams **NOT**  
accurately drawn

A cylinder has base radius  $x$  cm and height  $2x$  cm.

A cone has base radius  $x$  cm and height  $h$  cm.

The volume of the cylinder and the volume of the cone are equal.

Find  $h$  in terms of  $x$ .

Give your answer in its simplest form.

$$h = \dots\dots\dots$$

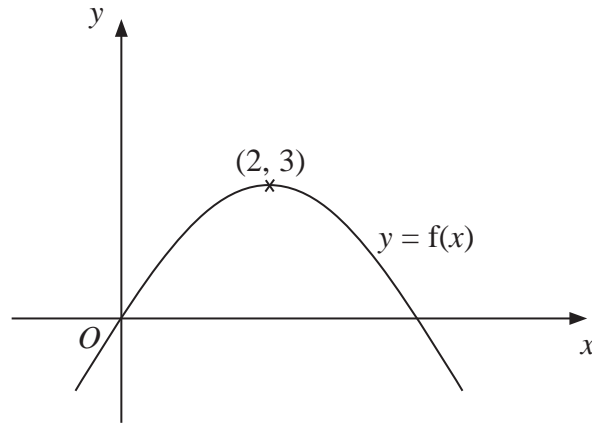
(Total 3 marks)

Q26



Leave blank

27.



The diagram shows part of the curve with equation  $y = f(x)$ .  
The coordinates of the maximum point of this curve are  $(2, 3)$ .

Write down the coordinates of the maximum point of the curve with equation

(a)  $y = f(x - 2)$

(..... , .....)  
(1)

(b)  $y = 2f(x)$

(..... , .....)  
(1)

**(Total 2 marks)**

**Q27**

28. Simplify fully  $\frac{x^2 + x - 6}{x^2 - 7x + 10}$

.....

**(Total 3 marks)**

**Q28**

**TOTAL FOR PAPER: 100 MARKS**

**END**

