

Write your name here

Surname

Other names

**Pearson**  
**Edexcel GCSE**

Centre Number

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Candidate Number

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# Methods in Mathematics

## Unit 1: Methods 1

*For Approved Pilot Centres ONLY*

**Higher Tier**

Monday 11 November 2013 – Morning

**Time: 1 hour 45 minutes**

Paper Reference

**5MM1H/01**

**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.

Turn over ►

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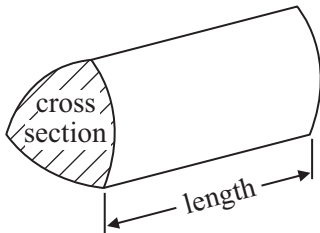
**PEARSON**

## GCSE Mathematics 2MM01

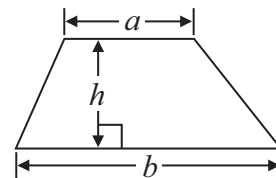
Formulae: Higher Tier

**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  $\times$  length

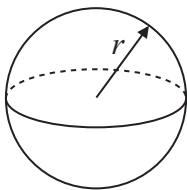


**Area of trapezium** =  $\frac{1}{2} (a + b)h$



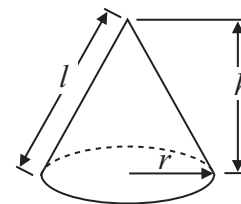
**Volume of sphere** =  $\frac{4}{3} \pi r^3$

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

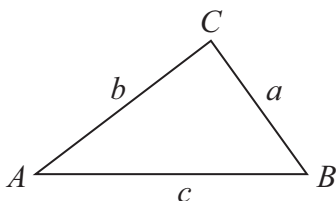


**Volume of cone** =  $\frac{1}{3} \pi r^2 h$

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



**In any triangle ABC**



**The Quadratic Equation**

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

**Write your answers in the spaces provided.**

**You must write down all stages in your working.**

**You must NOT use a calculator.**

**1** Given that

$$374 \times 85 = 31\,790$$

write down the value of

(i)  $3740 \times 850$

.....

(ii)  $37.4 \times 8.5$

.....

(iii)  $31790 \div 0.85$

.....

---

**(Total for Question 1 is 3 marks)**



2 Here are some letters.

A B C A A B D

Andy is going to take at random one of these letters.

(a) What is the probability that Andy will take a letter A?

.....  
(1)

Here are some numbers.

3 1 1 2 1 3 4 4 2

Samantha is going to take at random one of these numbers.

(b) What is the probability that Samantha will take a number 1 or a number 3?

.....  
(1)

**(Total for Question 2 is 2 marks)**

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3

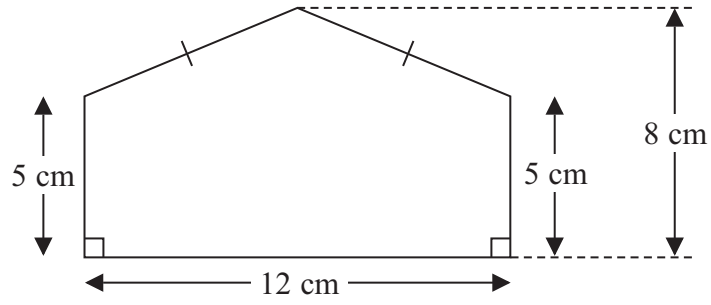


Diagram **NOT** accurately drawn

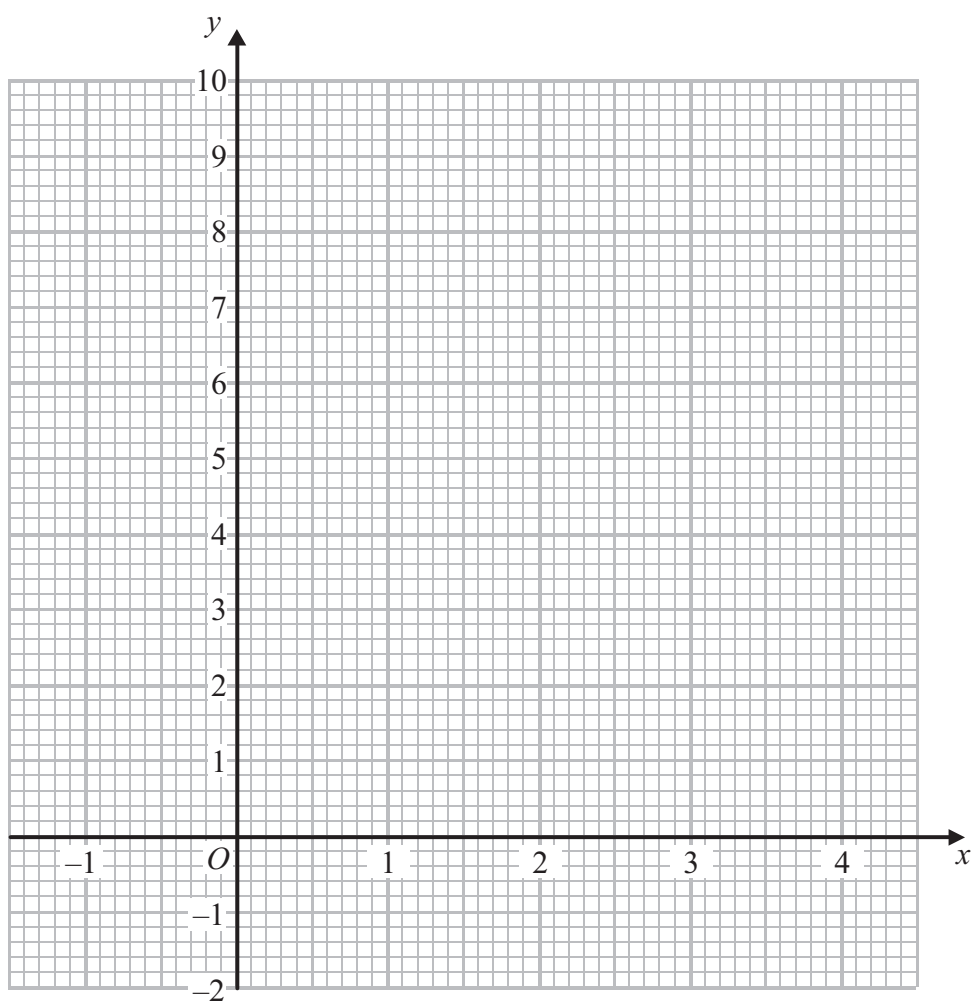
Work out the area of the shape.

..... cm<sup>2</sup>

**(Total for Question 3 is 4 marks)**



4 On the grid, draw the graph of  $y = 7 - 2x$  for values of  $x$  from  $x = -1$  to  $x = 4$



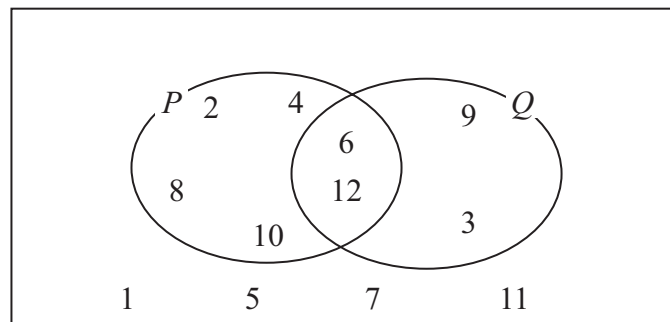
(Total for Question 4 is 3 marks)



5 Work out an estimate for the value of  $\frac{195.6}{0.495}$

.....  
(Total for Question 5 is 2 marks)

6 Here is a Venn diagram.



A student chooses at random a number from the Venn diagram.

Write down the probability that this number is **not** in set  $Q$ .

.....  
(Total for Question 6 is 2 marks)



7 (a) Write 220 as a product of its prime factors.

.....  
(2)

(b) Work out the Lowest Common Multiple (LCM) of 165 and 220

.....  
(2)

**(Total for Question 7 is 4 marks)**



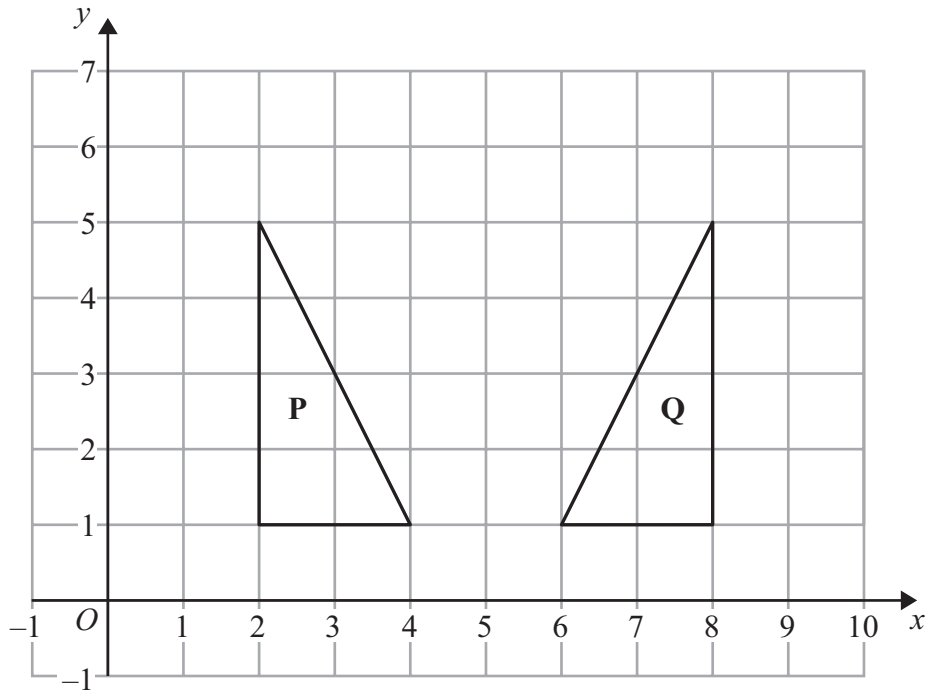


8 Solve  $7x + 2 = 3(x - 4)$

.....  
**(Total for Question 8 is 3 marks)**

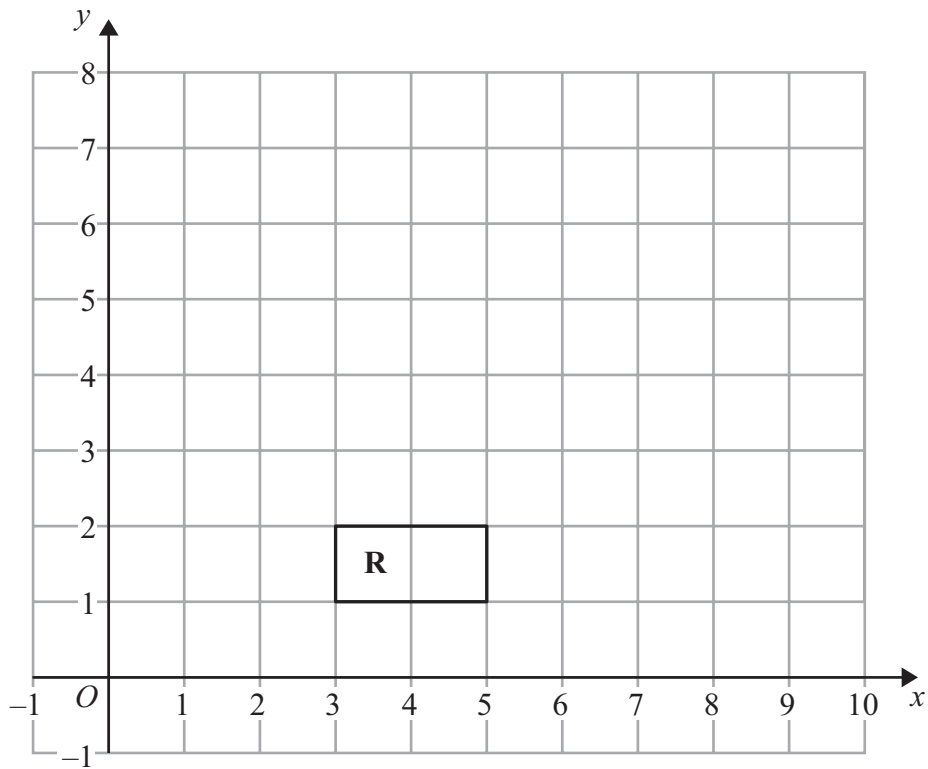
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(a) Describe fully the single transformation that maps triangle **P** onto triangle **Q**.

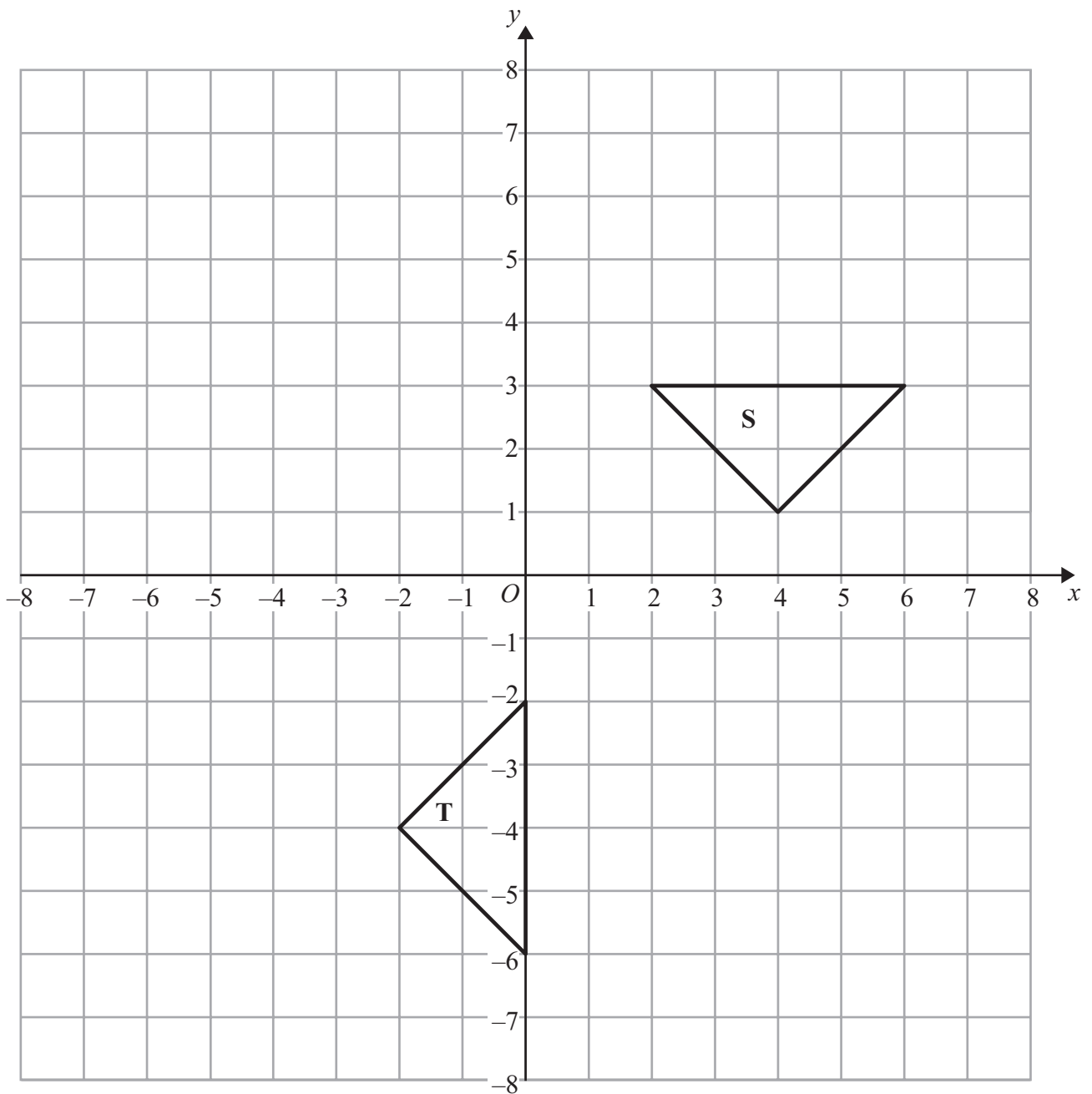
(2)



(b) Enlarge rectangle **R**, with scale factor 3 and centre (4, 0).

(2)





Shape **S** can be transformed to shape **T** by the translation  $\begin{pmatrix} 0 \\ -3 \end{pmatrix}$  followed by a rotation.

(c) Describe the rotation.

.....

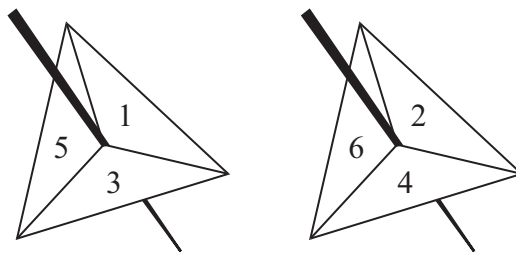
.....

(3)

**(Total for Question 9 is 7 marks)**



10 Jack has two fair 3-sided spinners.



Jack spins each spinner once.  
Each spinner lands on a number.

Jack multiplies these two numbers together to get his score.

(i) Work out the probability that Jack's score is 6

.....

(ii) Work out the probability that Jack's score is at least 10

.....

(Total for Question 10 is 5 marks)



11  $A$  and  $B$  are vertices of a cuboid.

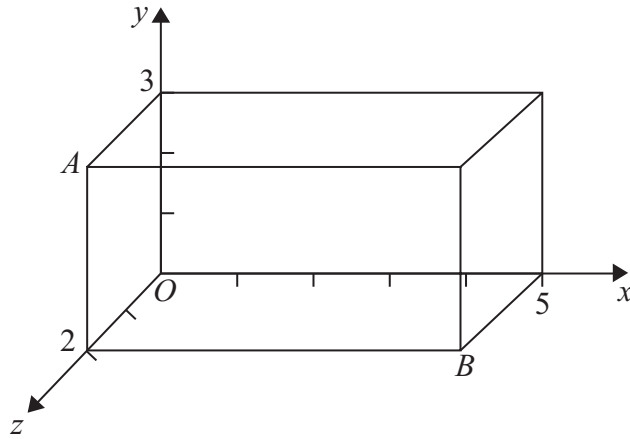


Diagram **NOT** accurately drawn

Work out the coordinates of the midpoint of  $AB$ .

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

**(Total for Question 11 is 3 marks)**



12 (a) Simplify  $a \times a^2$

.....  
(1)

(b) Simplify  $\frac{b^7}{b^3}$

.....  
(1)

(c) Simplify  $(c^3)^4$

.....  
(1)

(d) Expand and simplify  $5(x^2 + 2) + 2(3x^2 + 4)$

.....  
(2)

(e) Expand and simplify  $(x - 6)(x + 1)$

.....  
(2)

---

**(Total for Question 12 is 7 marks)**



13 (a) Work out  $\frac{2}{5} + \frac{1}{4}$

.....  
(2)

(b) Work out  $3\frac{1}{8} \times 2\frac{2}{5}$

Give your answer as a fraction in its simplest form.

.....  
(3)

**(Total for Question 13 is 5 marks)**

---



14 The  $n$ th term of a quadratic sequence is  $n^2 + 3n - 2$

(a) Find the fourth term of this sequence.

.....  
(2)

Here are the first five terms of a different quadratic sequence.

1    7    17    31    49

(b) Find, in terms of  $n$ , an expression for the  $n$ th term of this sequence.

.....  
(3)

**(Total for Question 14 is 5 marks)**

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15 (a) Write as an ordinary number  $7.4 \times 10^5$

.....  
(1)

(b) Write in standard form 0.00000035

.....  
(1)

(c) Work out  $(4 \times 10^{-6}) \div (8 \times 10^5)$   
Give your answer in standard form.

.....  
(2)

**(Total for Question 15 is 4 marks)**

---



16 (a) Factorise  $10x^2 + 5x$

.....  
(2)

(b) Factorise  $x^2 - 7x + 12$

.....  
(2)

**(Total for Question 16 is 4 marks)**

---



17 Here is some information about 100 students.

60 students study French.

36 students study Spanish.

14 students **do not** study either French or Spanish.

(a) Draw a Venn diagram to show this information.

(4)

One of the 100 students is picked at random.

(b) Work out the probability that this student studies French or Spanish or both.

.....  
(2)

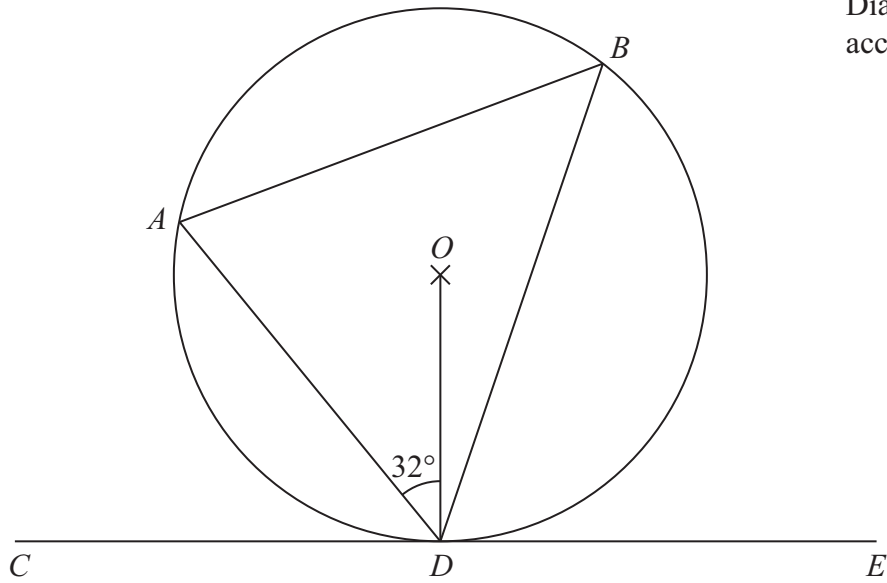
**(Total for Question 17 is 6 marks)**

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\*18

Diagram **NOT**  
accurately drawn



$A$ ,  $B$  and  $D$  are points on a circle, centre  $O$ .  
 $CDE$  is a tangent to the circle.  
Angle  $ADO$  is  $32^\circ$

Work out the size of angle  $ABD$ .  
Give reasons for your answer.

(Total for Question 18 is 4 marks)



19 There are 8 counters in a bag.

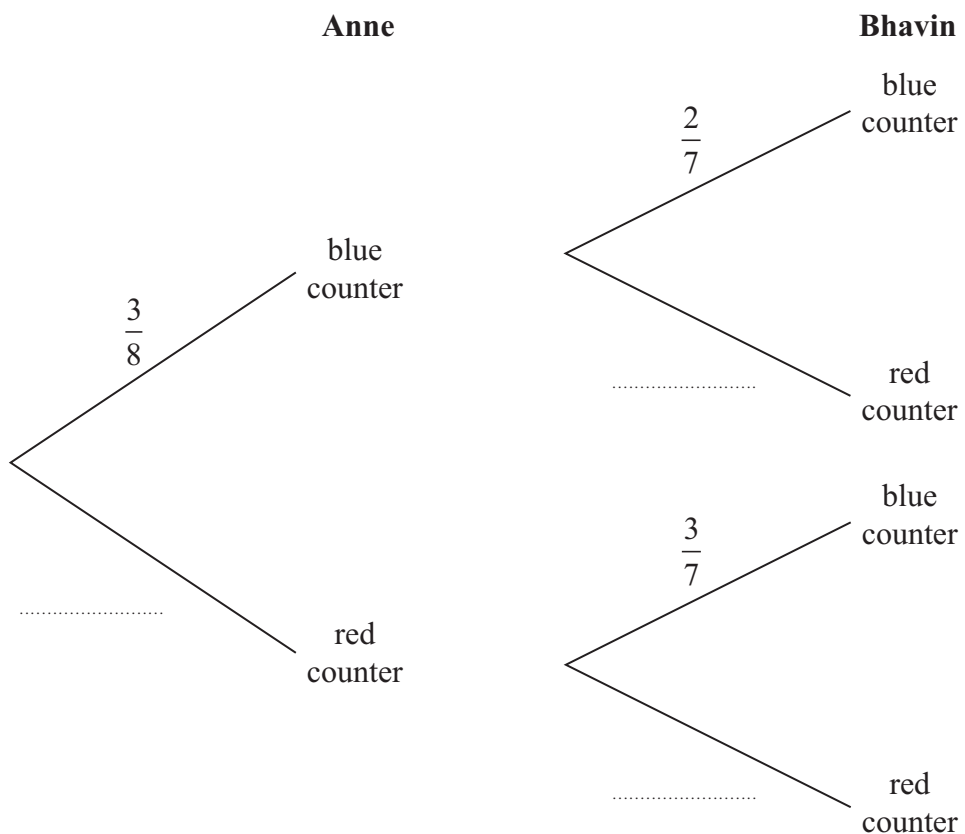
3 of the counters are blue.

5 of the counters are red.

Anne takes at random a counter from the bag.

Bhavin then takes at random a counter from the bag.

(a) Complete the probability tree diagram below.



(2)

(b) Work out the probability that Anne and Bhavin each take a blue counter.

.....  
(2)

(Total for Question 19 is 4 marks)



- 20 (a) Write the following five numbers in order of size.  
Start with the smallest number.

$$2^0 \quad \sqrt{2} \quad \frac{1}{2} \quad 2^{-2} \quad \frac{1}{\sqrt{2}}$$

---

(2)

(b) Simplify  $\left(\frac{2}{\sqrt{2}}\right)^3$

Give your answer in the form  $a\sqrt{2}$  where  $a$  is an integer.

---

(3)

(Total for Question 20 is 5 marks)



\*21

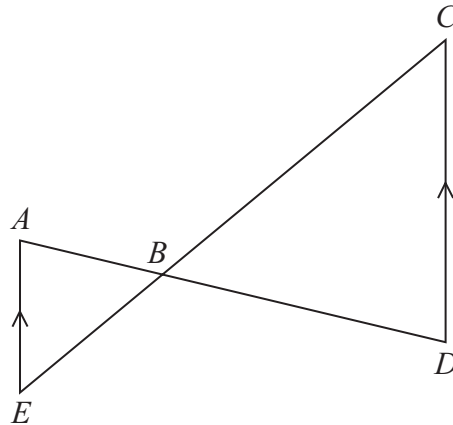


Diagram **NOT**  
accurately drawn

$AE$  is parallel to  $CD$ .

$ABD$  and  $EBC$  are straight lines.

Prove that triangle  $ABE$  is similar to triangle  $DBC$ .

Give reasons for each stage of your proof.

---

(Total for Question 21 is 4 marks)



22  $A$  is an event such that  $P(A) = \frac{1}{4}$

(a) Write down the value of  $P(A')$ .

.....  
(1)

$B$  is an event such that  $P(B) = \frac{3}{5}$

$A$  and  $B$  are independent.

(b) Work out the value of  $P(A' \cap B)$ .

.....  
(2)

(Total for Question 22 is 3 marks)

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\*23 Given that  $a$  and  $b$  are two consecutive even numbers, prove algebraically that

$$\left(\frac{a+b}{2}\right)^2 \text{ is always 1 less than } \frac{a^2 + b^2}{2}$$

(Total for Question 23 is 5 marks)



P 4 3 6 0 6 A 0 2 5 2 8

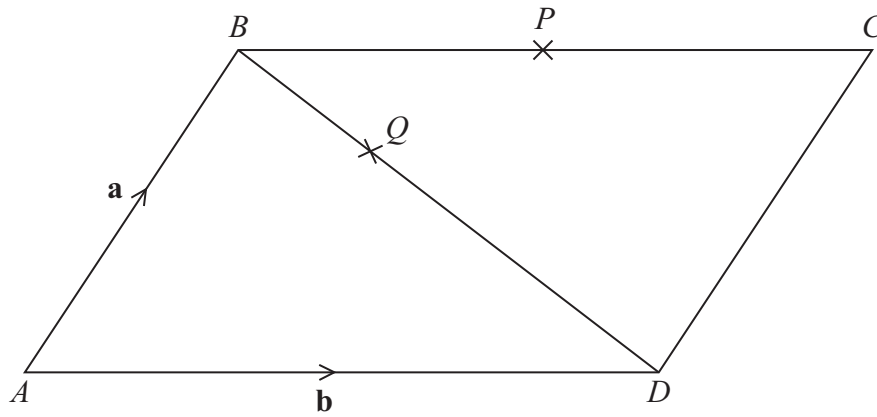


Diagram **NOT**  
accurately drawn

$ABCD$  is a parallelogram.

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

$$\vec{AD} = \mathbf{b}$$

$P$  is the midpoint of  $BC$ .

(a) Express in terms of  $\mathbf{a}$  and/or  $\mathbf{b}$

(i)  $\vec{BP}$

(ii)  $\vec{BD}$

.....

.....

(2)



$Q$  is a point on  $BD$  such that  $BQ : QD = 1 : 2$

(b) Express in terms of  $\mathbf{a}$  and  $\mathbf{b}$

(i)  $\overrightarrow{AP}$

(ii)  $\overrightarrow{AQ}$

.....  
.....  
(3)

(c) Explain what your answers to part (b) tell you about the position of the point  $Q$ .

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

**(Total for Question 24 is 6 marks)**

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**TOTAL FOR PAPER IS 100 MARKS**



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