Write your name here

| Surname | Other names |
|---|---|
| | |

**Pearson**
**Edexcel GCSE**

Centre Number | | | | | |

Candidate Number | | | | |

# Methods in Mathematics

## Unit 1: Methods 1

***For Approved Pilot Centres ONLY***

**Higher Tier**

Tuesday 13 June 2017 – 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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6/6/7/5/

P 5 3 5 0 4 A 0 1 2 4

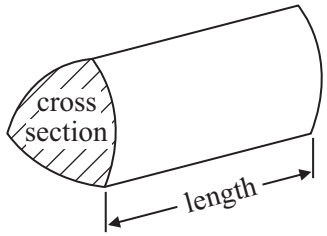
Pearson

**GCSE Mathematics 2MM01**

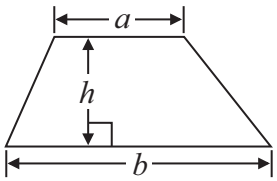
Formulae: Higher Tier

**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 × length

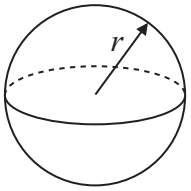



**Area of trapezium** = $\frac{1}{2}(a + b)h$



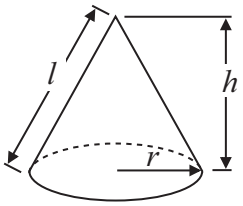

**Volume of sphere** = $\frac{4}{3}\pi r^3$

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

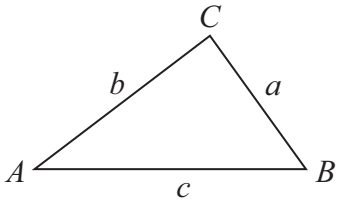



**Volume of cone** = $\frac{1}{3}\pi r^2 h$

**Curved surface area of cone** = $\pi rl$




**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** There are 20 counters in a box.

6 of the counters are red.
5 of the counters are green.
The rest of the counters are blue.

Lethna takes at random one of the counters from the box.

Find the probability that she takes

(i) a blue counter,

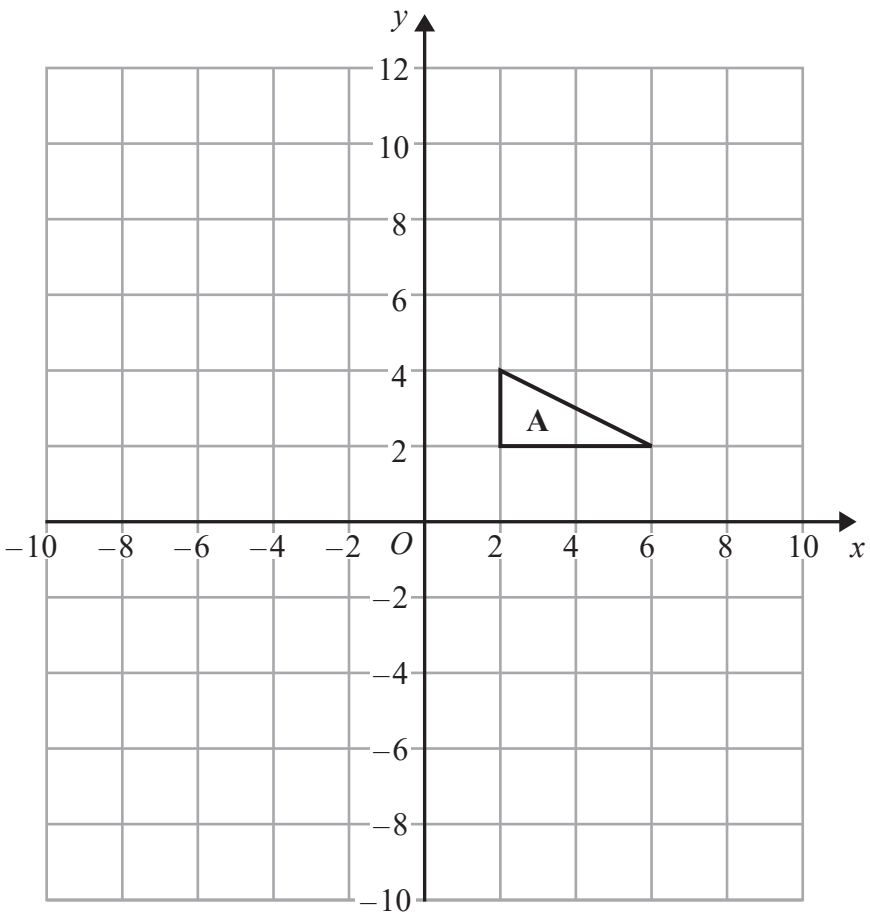
.....

(ii) a counter that is **not** green.

.....

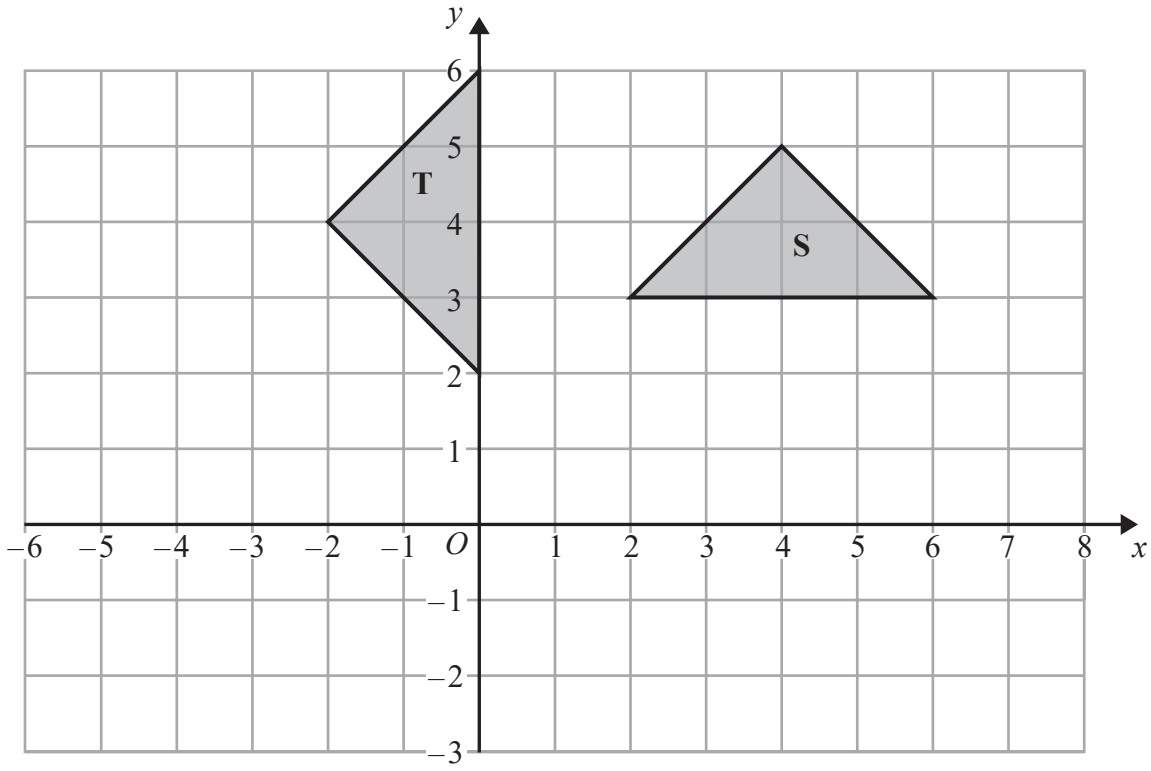
**(Total for Question 1 is 4 marks)**

**2**




(a) Enlarge triangle **A** with scale factor 2 and centre (2, 2).

**(2)**




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

(b) Describe the rotation.

.....

.....

**(3)**

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

**3**

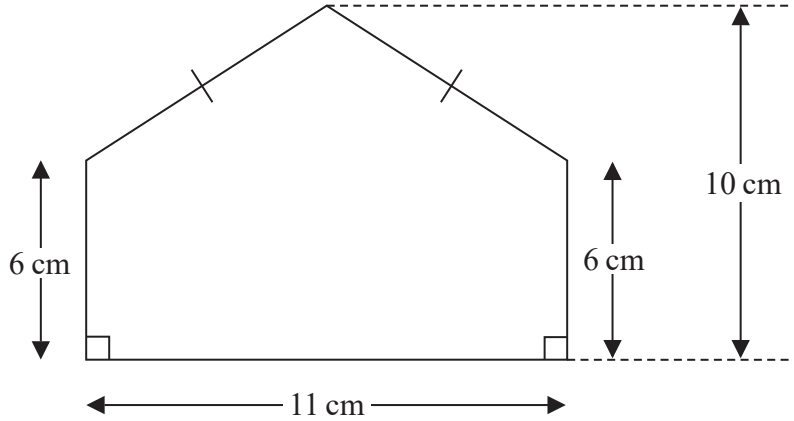


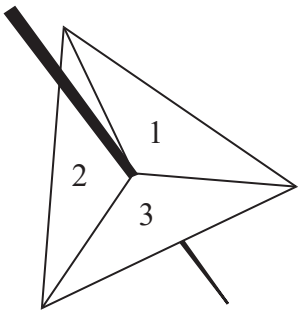

Diagram **NOT** accurately drawn

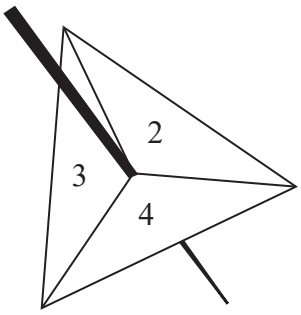
Work out the area of the shape.

.....

**(Total for Question 3 is 5 marks)**

**4** Michelle has two fair 3-sided spinners.




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

Michelle multiplies these two numbers together to get her score.

(i) Work out the probability that Michelle's score is 4

.....

(ii) Work out the probability that Michelle's score is at least 8

.....

**(Total for Question 4 is 5 marks)**

***5**

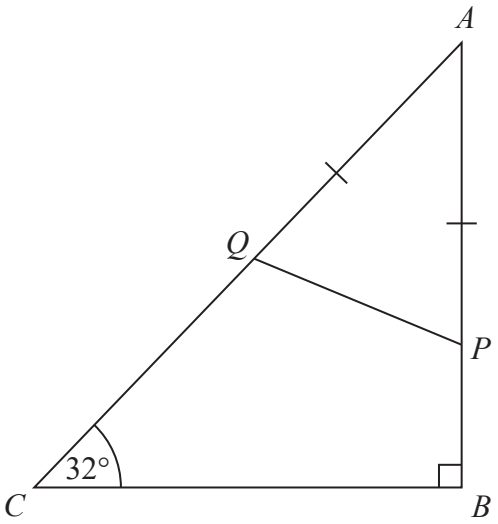



Diagram **NOT** accurately drawn

*ABC* is a right-angled triangle.
Angle *ABC* = 90°
Angle *ACB* = 32°

*P* is a point on *AB*.
*Q* is a point on *AC*.
*AP* = *AQ*

Work out the size of angle *APQ*.
Give reasons for each stage of your working.

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

**6** Given that $372 \times 68 = 25\,296$

find the value of

(a) $3720 \times 68$

.....

**(1)**

(b) $3.72 \times 0.68$

.....

**(1)**

(c) $252.96 \div 34$

.....

**(2)**

**(Total for Question 6 is 4 marks)**

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**7** Here is a rectangle.

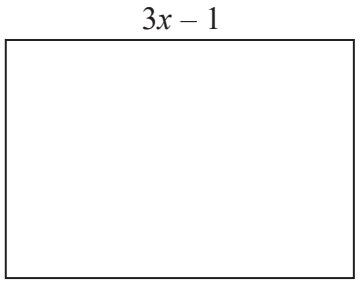



Diagram **NOT** accurately drawn

All measurements are in centimetres.

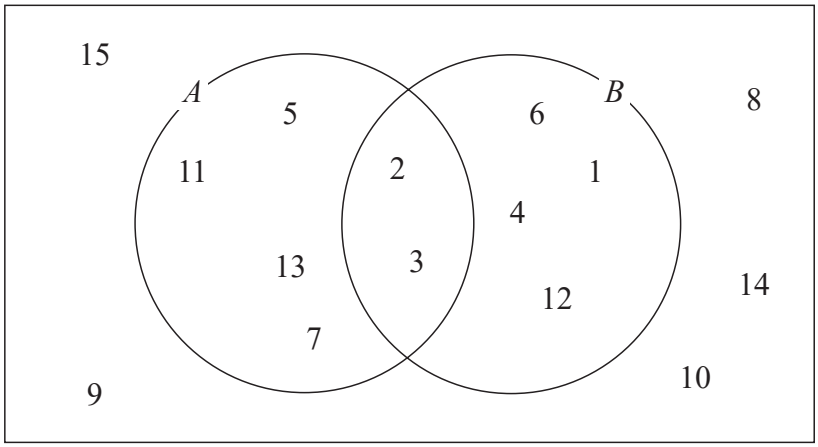
The perimeter of the rectangle is 39 cm.

Work out the area of the rectangle.
You must show all your working.

..... $cm^2$

**(Total for Question 7 is 5 marks)**

**8** The Venn diagram shows the numbers from 1 to 15




(i) Find P($A \cap B$)

.....

(ii) Find P($A \cup B$)

.....

(iii) Find P($B'$)

.....

**(Total for Question 8 is 5 marks)**

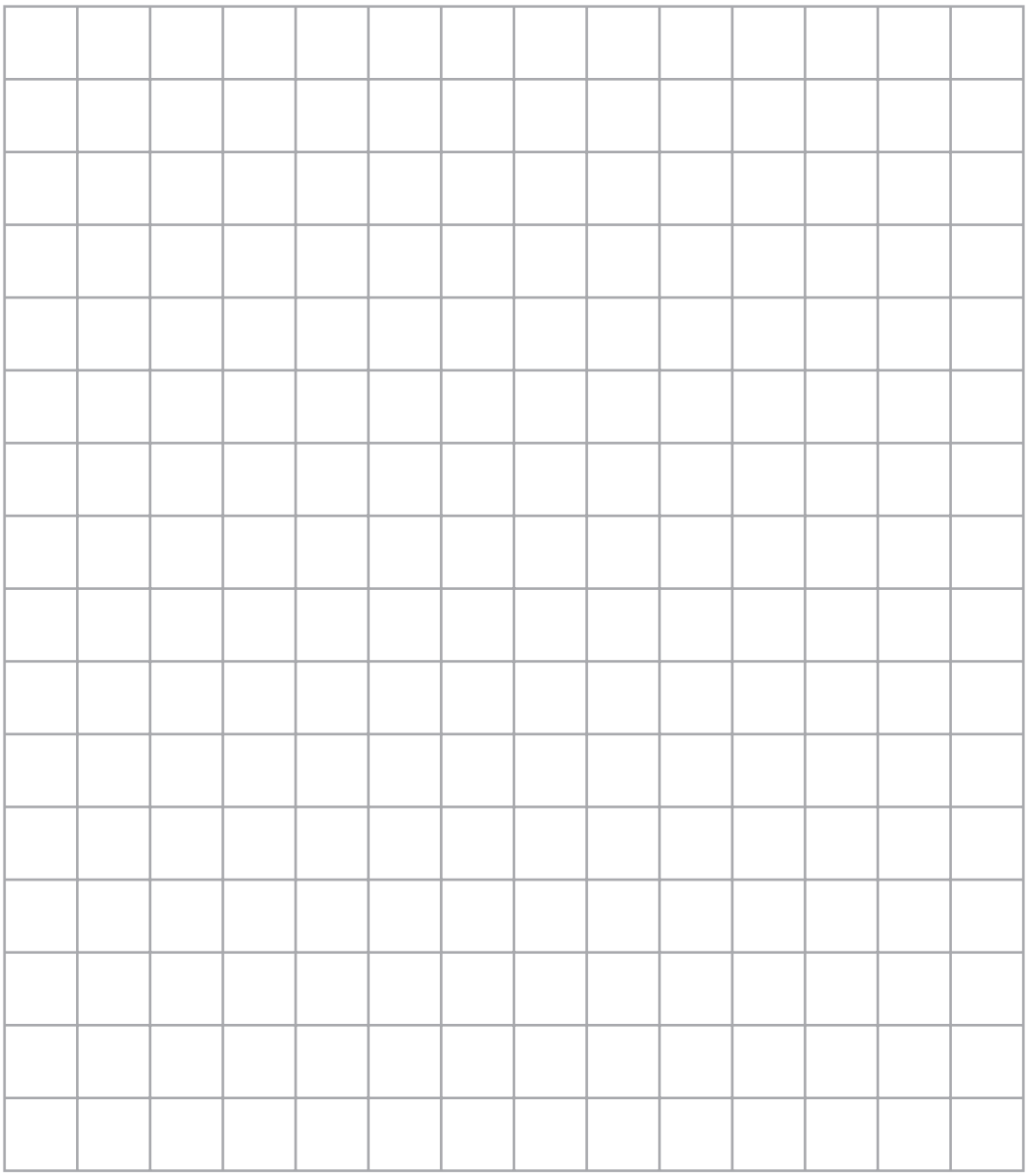
**9** Work out $4\frac{3}{8} \div 5\frac{1}{4}$

Give your answer as a fraction in its simplest form.

.....

**(Total for Question 9 is 3 marks)**

**10** On the grid, draw the graph of $y = 3x + 2$ for values of $x$ from $-2$ to 2



**(Total for Question 10 is 4 marks)**

**11** (a) Write 140 as a product of its prime factors.

.....

**(2)**

(b) Find the Highest Common Factor (HCF) of 140 and 110

.....

**(2)**

(c) Find the Lowest Common Multiple (LCM) of 140 and 110

.....

**(2)**

**(Total for Question 11 is 6 marks)**

**12** The $n$th term of a quadratic sequence is $n^2 - 4n + 5$

(a) Find the third term of this sequence.

.....

**(2)**

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

5 11 21 35 53

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

.....

**(3)**

**(Total for Question 12 is 5 marks)**

**13** (a) Write the number 28 000 000 in standard form.

.....

**(1)**

(b) Write $8.32 \times 10^{-4}$ as an ordinary number.

.....

**(1)**

(c) Work out $(1.2 \times 10^4) + (2.5 \times 10^3)$
Give your answer in standard form.

.....

**(2)**

**(Total for Question 13 is 4 marks)**

**14**

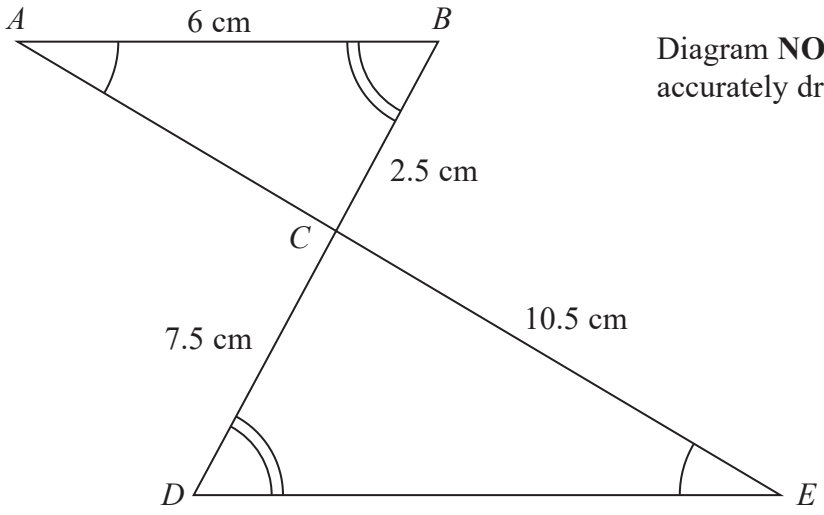



Diagram **NOT** accurately drawn

Triangles *ABC* and *EDC* are similar.

*ACE* and *BCD* are straight lines.

Angle *BAC* = angle *DEC*
Angle *CBA* = angle *CDE*

*AB* = 6 cm, *BC* = 2.5 cm, *CD* = 7.5 cm and *CE* = 10.5 cm.

(a) Work out the length of *DE*.

.....cm

**(2)**

(b) Work out the length of *AE*.

.....cm

**(2)**

**(Total for Question 14 is 4 marks)**

**15** (a) Solve $9 = 4(c - 2)$

$c =$ .....

**(3)**

(b) Solve $x^2 - x - 12 = 0$

.....

**(3)**

**(Total for Question 15 is 6 marks)**

**16** (a) Find the value of $36^{\frac{1}{2}}$

.....

**(1)**

(b) Find the value of $4^{-2}$

.....

**(1)**

(c) Write down the value of $10^0$

.....

**(1)**

**(Total for Question 16 is 3 marks)**

**17** (a) Factorise $9p^2 - 1$

.....

**(1)**

(b) Factorise fully $4(x + y)^2 - 2(x + y)$

.....

**(2)**

(c) Expand and simplify $(3a - 5b)(2a + 3b)$

.....

**(2)**

(d) Simplify fully $\dfrac{2w - 1}{2w^2 - 9w + 4}$

.....

**(2)**

**(Total for Question 17 is 7 marks)**

***18**

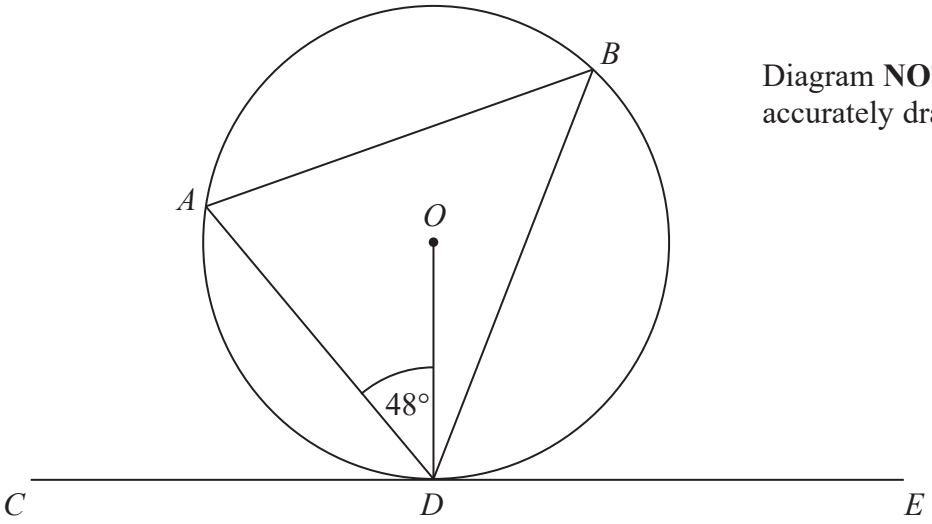



Diagram **NOT** accurately drawn

*A*, *B* and *D* are points on a circle, centre *O*.
*CDE* is a tangent to the circle.
Angle *ADO* = 48°

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

**(Total for Question 18 is 4 marks)**

***19** Given that $p$ and $r$ are two consecutive even numbers, prove algebraically that

$\frac{p^2 + r^2}{2}$ is always 1 more than $\left(\frac{p + r}{2}\right)^2$

**(Total for Question 19 is 5 marks)**

**20** There are only 5 black counters, 4 red counters and 2 white counters in a bag.

Charlie takes at random two counters from the bag.

Work out the probability that Charlie takes at least one red counter.

.....

**(Total for Question 20 is 4 marks)**

**21** Write $\frac{1}{1-x} - \frac{2}{1+x}$

as a single fraction in its simplest form.

.....

**(Total for Question 21 is 3 marks)**

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**22**

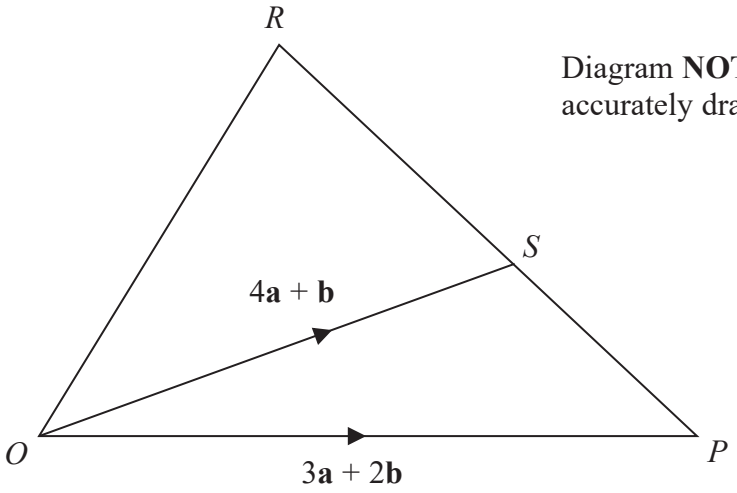


Diagram **NOT** accurately drawn

*OPR* is a triangle.
*PSR* is a straight line.

$\overrightarrow{OP} = 3\mathbf{a} + 2\mathbf{b}$
$\overrightarrow{OS} = 4\mathbf{a} + \mathbf{b}$

(a) Show that $\overrightarrow{SP} = \mathbf{b} - \mathbf{a}$

**(1)**

$\overrightarrow{OR} = 7\mathbf{a} - 2\mathbf{b}$

(b) Find the ratio $RS : SP$ in its simplest form.

.....

**(3)**

**(Total for Question 22 is 4 marks)**

**TOTAL FOR PAPER IS 100 MARKS**

**END**

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