Pearson Edexcel GCSE

Centre Number

Candidate Number

Methods in Mathematics
Unit 1: Methods 1
For Approved Pilot Centres ONLY

Higher Tier

Monday 10 November 2014 – 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.

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
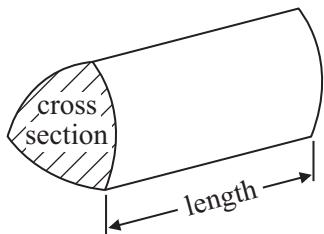
Area of trapezium = $\frac{1}{2}(a + b)h$
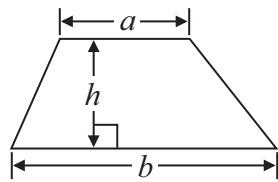
Volume of sphere = $\frac{4}{3}\pi r^3$

Surface area of sphere = $4\pi r^2$
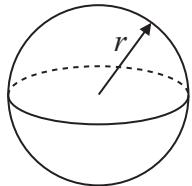
Volume of cone = $\frac{1}{3}\pi r^2 h$

Curved surface area of cone = $\pi r l$
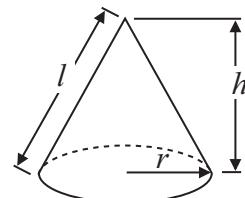
In any triangle *ABC*
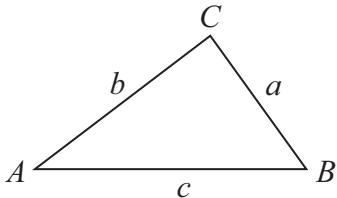
The Quadratic Equation
The solutions of $ax^2 + bx + c = 0$
where $a \neq 0$, are given by

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

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

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 (a) Work out 24.5×1.8

....

(3)

(b) Work out $46.08 \div 1.2$

....

(3)

(Total for Question 1 is 6 marks)

2 Using the information that $15.6 \times 28 = 436.8$

(i) write down the value of 156×2.8

....

(ii) find the value of 15.6×29

....

(Total for Question 2 is 2 marks)

***3**
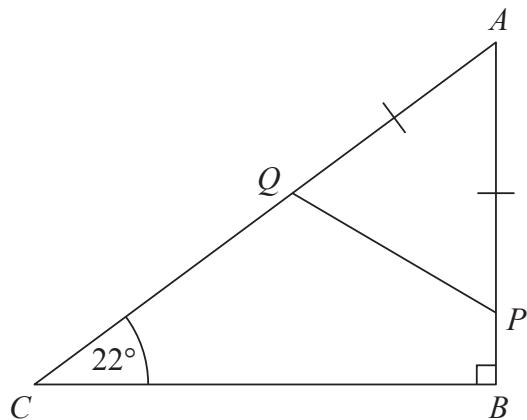


Diagram **NOT**
accurately drawn

ABC is a right-angled triangle.
Angle $B = 90°$
Angle $ACB = 22°$

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 3 is 5 marks)

P 4 4 5 8 1 A 0 4 2 4

4 Here are two fair 3-sided spinners.
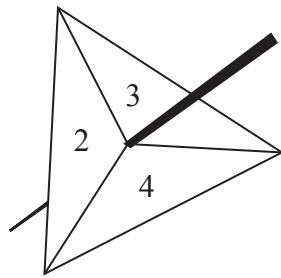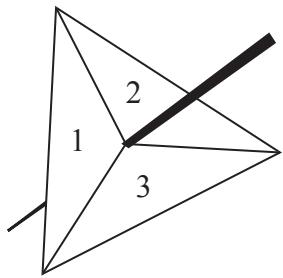
Lottie spins each of the spinners once.
Each spinner lands on a number.
Lottie multiplies the two numbers together to get the score.

(i) Find the probability that the score is 12

....

(ii) Find the probability that the score is less than 8

....

(Total for Question 4 is 5 marks)

5 There are 30 children in a class.

21 of the children sing in the choir.
10 of the children play in the band.
6 of the children sing in the choir **and** play in the band.

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

(4)

One of the children from the class is chosen at random.

(b) Work out the probability that this child plays in the band, but does **not** sing in the choir.

....

(2)

(Total for Question 5 is 6 marks)

6 (a) Simplify $m \times m \times m \times m$

....
(1)

(b) Simplify $p^9 \div p^3$

....
(1)

(c) Simplify $4x^2y \times 7x^3y^2$

....
(2)

(d) Expand and simplify $3(x - 2y) + 5(x + y)$

....
(2)

(Total for Question 6 is 6 marks)

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7 There are 50 counters in a bag.

The counters are blue or yellow or black or white.
A counter is taken at random from the bag.

The table shows each of the probabilities that the counter will be blue or black or white.

Colour	blue	yellow	black	white
Probability	0.4		0.3	0.16

Work out the number of yellow counters in the bag.

....

(Total for Question 7 is 4 marks)

Turn over ▶

8 The diagram shows a pentagon *ABCDE*.
The pentagon has one line of symmetry.
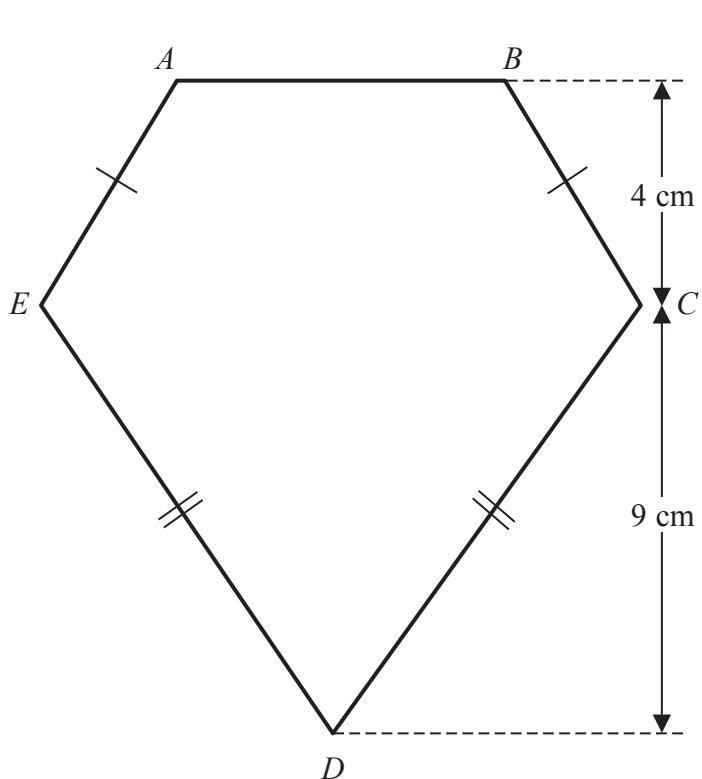
Diagram **NOT** accurately drawn

In *ABCDE*,

  AB = 6 cm
  EC = 10 cm

  AB is parallel to *EC*

Work out the area of the pentagon *ABCDE*.

....

(Total for Question 8 is 5 marks)

*9 *PQRS* is a square.

$$P \quad\quad 3x - 2 \quad\quad Q$$

Diagram **NOT** accurately drawn

$$x + 1$$

$$S \quad\quad\quad\quad R$$
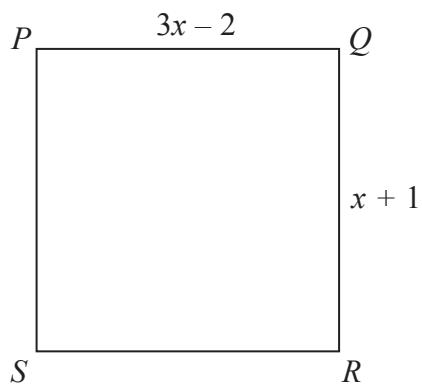
All measurements are in centimetres.

Show that the perimeter of the square is 10 cm.

(Total for Question 9 is 4 marks)

Turn over ▶

10 The diagram shows a cuboid on a 3-D grid.
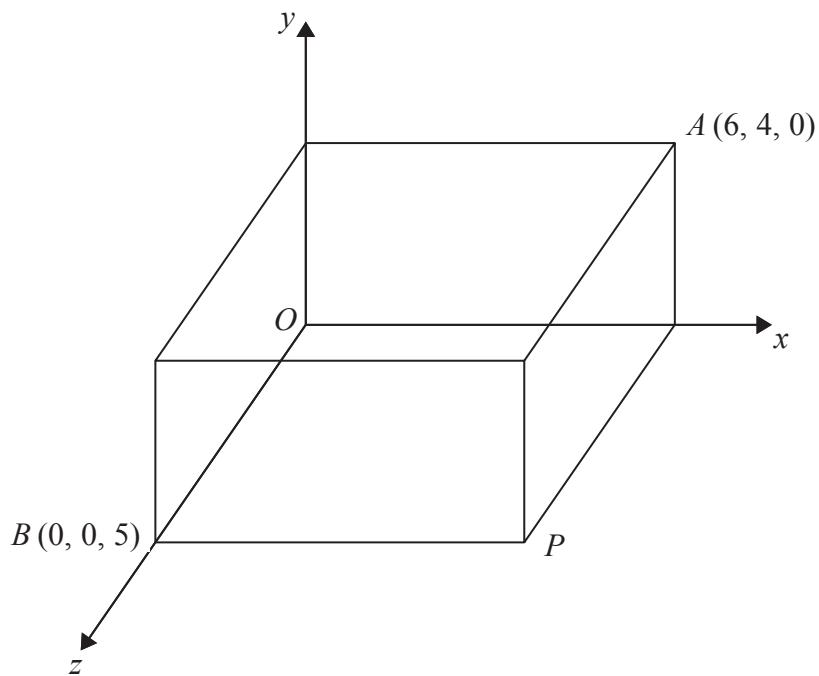
Diagram **NOT** accurately drawn

The point *A* has coordinates (6, 4, 0).

The point *B* has coordinates (0, 0, 5).

(a) Write down the coordinates of the point *P*.

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

(1)

(b) Find the coordinates of the midpoint of *AB*.

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

(2)

(Total for Question 10 is 3 marks)

P 4 4 5 8 1 A 0 1 0 2 4

*11 The diagram shows a straight line **L** drawn on a grid.
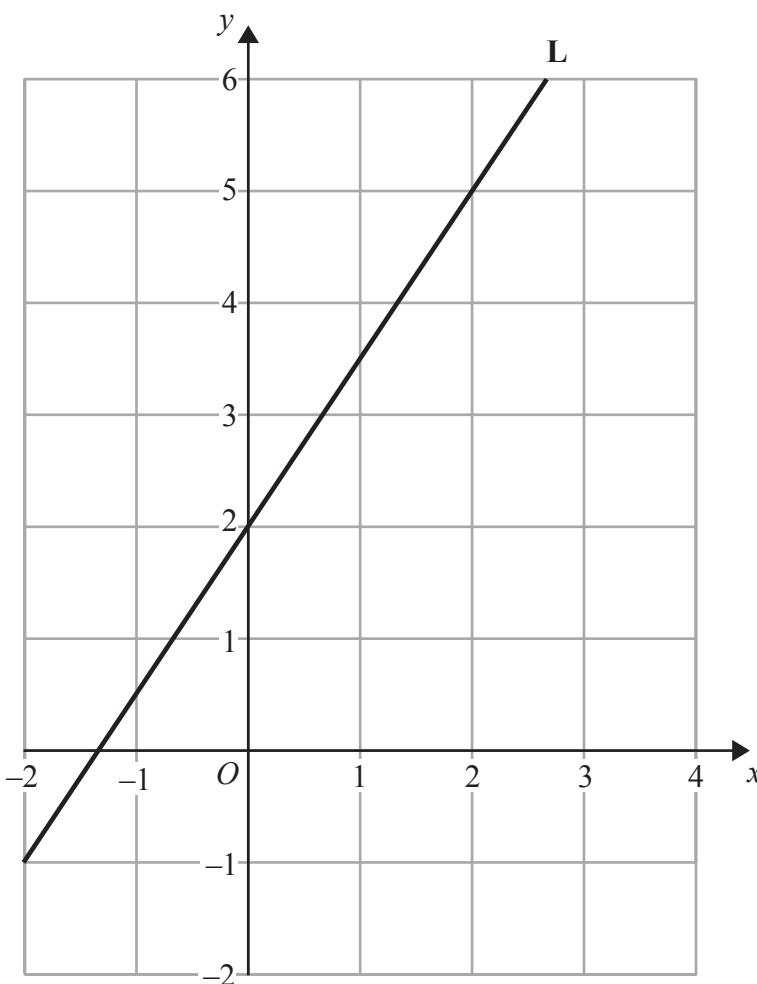
$y = 2x - 1$ is the equation of a different straight line.

Which straight line has the greater gradient?
Show how you get your answer.

(Total for Question 11 is 4 marks)

P 4 4 5 8 1 A 0 1 1 2 4

Turn over ▶

12
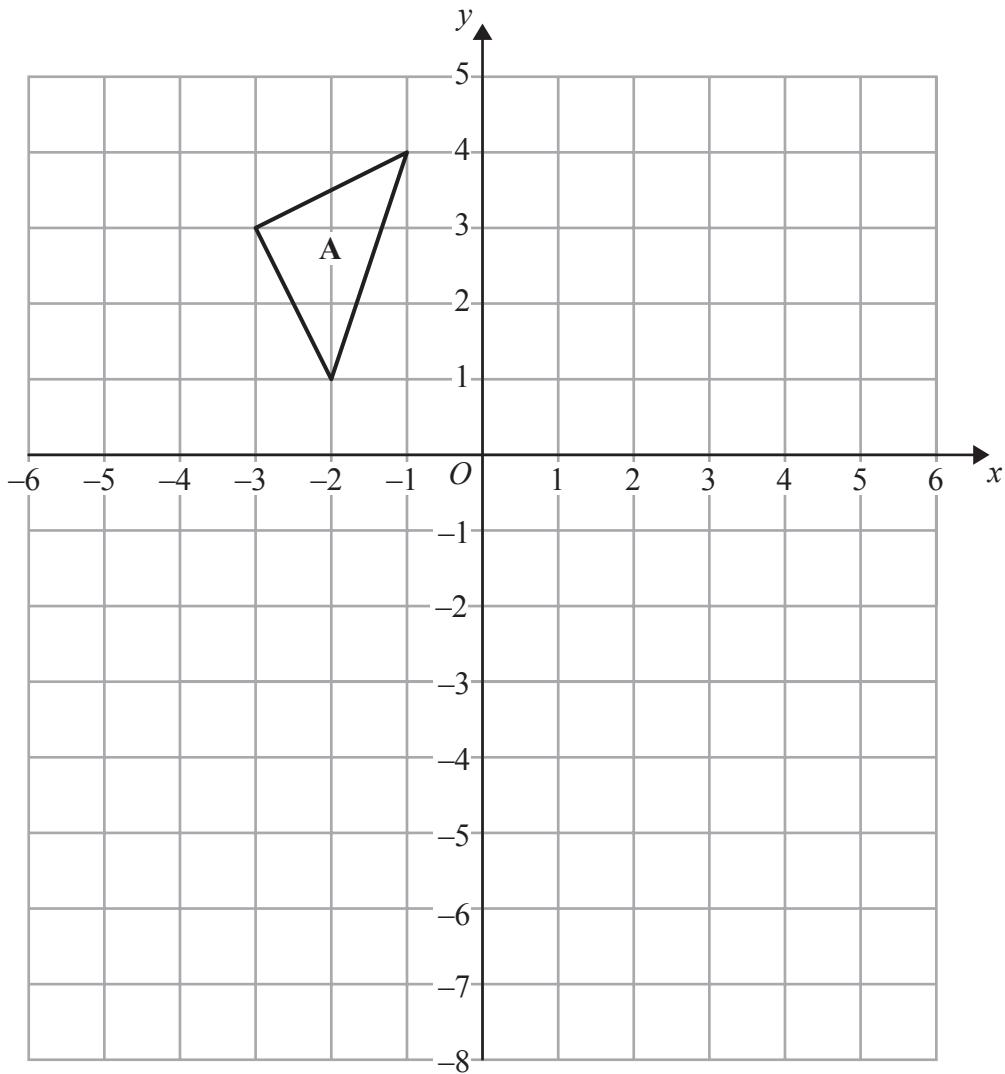
Triangle **A** is mapped onto triangle **B** by a reflection in the *y*-axis.
Triangle **B** is mapped onto triangle **C** by a reflection in the line *y* = –1

Describe a **single** transformation that maps triangle **A** onto triangle **C**.

....

....

....

(Total for Question 12 is 3 marks)

13 The universal set is {a, b, c, d, e, f, g, h, i, j, k}

Set X = {a, e, g, k}
Set Y = {a, b, c, d, f, g, j}

A letter is to be chosen at random from the universal set.

(a) Work out P(X)

....

(2)

(b) Work out P($X \cap Y$)

....

(2)

(c) Work out P(Y')

....

(1)

(Total for Question 13 is 5 marks)

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14 (a) Write in standard form 250×10^3

....

(1)

(b) Write as an ordinary number 3.59×10^{-2}

....

(1)

(c) Work out $1.5 \times 10^4 + 6.3 \times 10^3$

Give your answer in standard form.

....

(2)

(Total for Question 14 is 4 marks)

15 The diagram shows two similar triangles.

Diagram **NOT** accurately drawn

9 cm

15 cm

$x°$

$x°$

10 cm

y cm
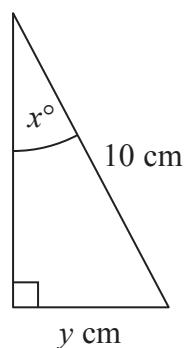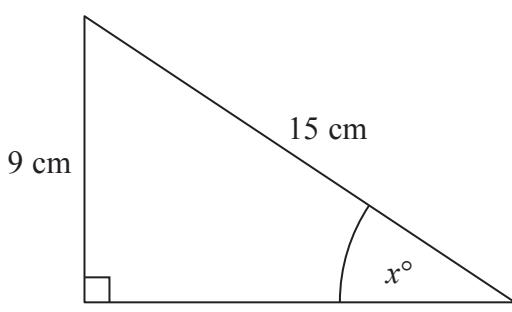
Find the value of y.

....

(Total for Question 15 is 2 marks)

16 (a) Factorise fully $5 - 80x^2$

....

(2)

(b) Expand and simplify $(2x - 5y)(3x - 4y)$

....

(2)

(Total for Question 16 is 4 marks)

17 (a) Write down the value of $9^{\frac{1}{2}}$

....

(1)

(b) Write down the value of $8^{-\frac{1}{3}}$

....

(1)

$2^k = 16$

(c) Write down the value of k.

....

(1)

(d) Solve $8^5 = 2^{2m+3}$

....

(3)

(Total for Question 17 is 6 marks)

18 Solve $\dfrac{2x-3}{2} + \dfrac{x+6}{3} = 1$

....

(Total for Question 18 is 4 marks)

19 Whenever Finlay plays a tennis match the probability that he wins is 0.7

Finlay plays two tennis matches.

(a) Complete the probability tree diagram.

First match   Second match

win
....
                                        win
0.7
....
                                        lose

                    ....
                                        win
....   lose
                    ....
                                        lose
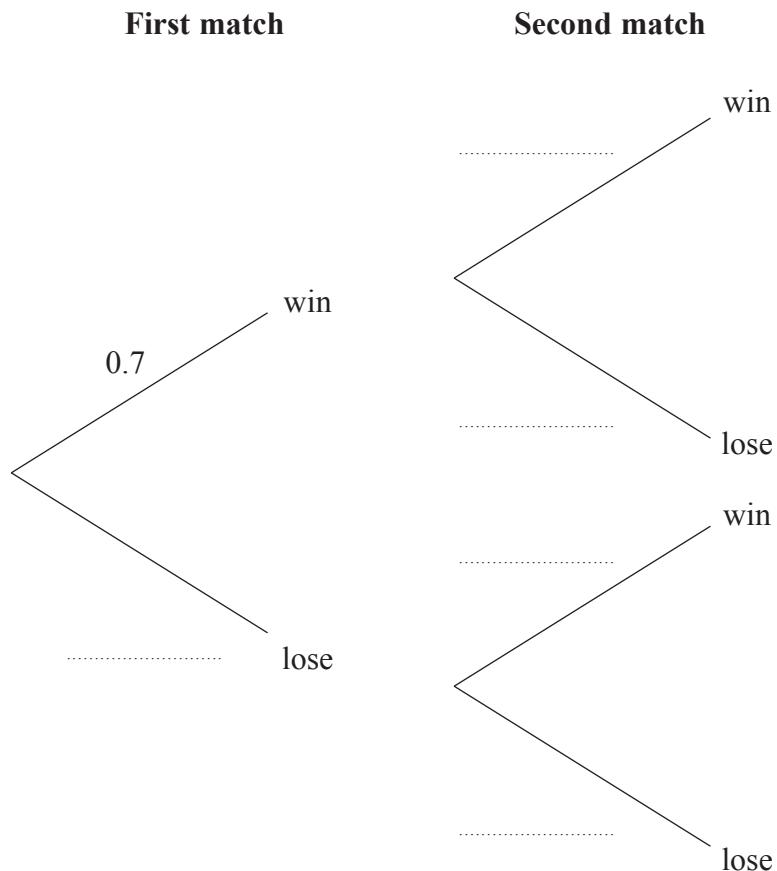
(2)

(b) Work out the probability that Finlay wins both matches.

....

(2)

(c) Work out the probability that Finlay loses at least one match.

....

(2)

(Total for Question 19 is 6 marks)

20 Solve $(x - 1)^2 - 2(x - 1) - 3 = 0$

....

(Total for Question 20 is 4 marks)

*21
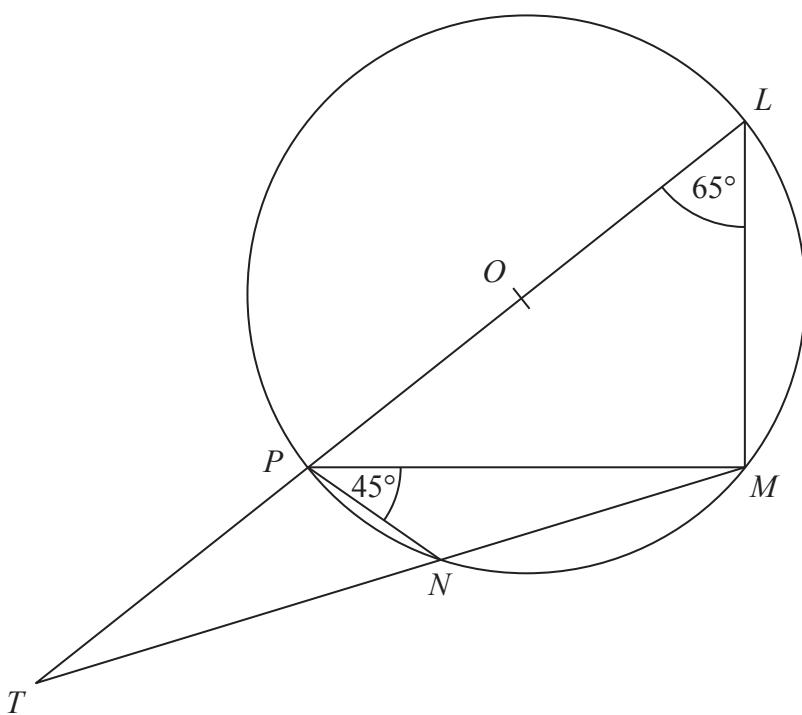
Diagram **NOT** accurately drawn

L, M, N and P are points on the circumference of a circle, centre O.
LOPT and MNT are straight lines.

Angle *MLP* = 65°.
Angle *NPM* = 45°.

Work out the size of angle *NTP*.
Give a reason for each stage of your working.

(Total for Question 21 is 5 marks)

Turn over ▶

22 Simplify fully $\dfrac{2x^2 + 9x - 5}{6x^2 - 5x + 1}$

....

(Total for Question 22 is 3 marks)

23
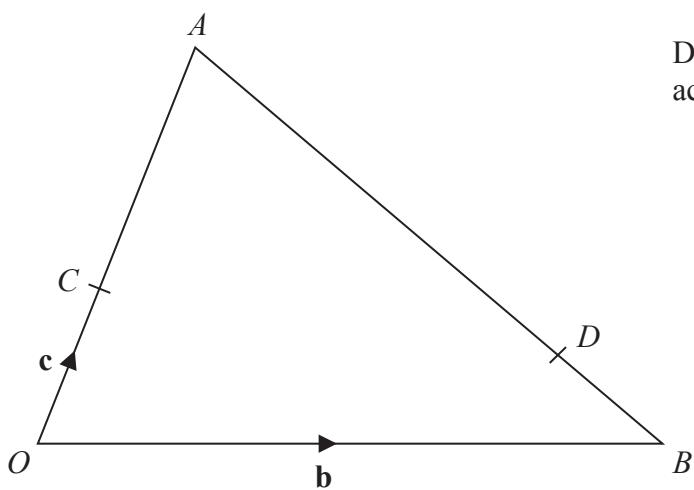
Diagram **NOT** accurately drawn

In the diagram,

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

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

$\overrightarrow{OC} = \dfrac{1}{3}\overrightarrow{OA}$

$\overrightarrow{BD} = \dfrac{1}{4}\overrightarrow{BA}$

Find $\overrightarrow{CD}$ in terms of **b** and **c**.
Give your answer in its simplest form.
You must show all your working.

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(Total for Question 23 is 4 marks)

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