www.dynamicpapers.com

Cambridge International Examinations
Cambridge International General Certificate of Secondary Education

CANDIDATE NAME

CENTRE NUMBER

CANDIDATE NUMBER

9418659189

MATHEMATICS **0580/42**

Paper 4 (Extended) **May/June 2017**

2 hours 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Electronic calculator
Tracing paper (optional)
Geometrical instruments

READ THESE INSTRUCTIONS FIRST

Write your Centre number, candidate number and name on all the work you hand in.
Write in dark blue or black pen.
You may use an HB pencil for any diagrams or graphs.
Do not use staples, paper clips, glue or correction fluid.
DO **NOT** WRITE IN ANY BARCODES.

Answer **all** questions.
If working is needed for any question it must be shown below that question.
Electronic calculators should be used.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place.
For π, use either your calculator value or 3.142.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total of the marks for this paper is 130.

This document consists of **20** printed pages.

© UCLES 2017

www.dynamicpapers.com

1 **(a)** Annie and Dermot share \$600 in the ratio 11 : 9.

(i) Show that Annie receives \$330.

[1]

(ii) Find the amount that Dermot receives.

\$ ..... [1]

(b) **(i)** Annie invests \$330 at a rate of 1.5% per year compound interest.

Calculate the amount that Annie has after 8 years.
Give your answer correct to the nearest dollar.

\$ ..... [3]

(ii) Find the amount of **interest** that Annie has, after the 8 years, as a percentage of the \$330.

..... % [2]

www.dynamicpapers.com

(c) Dermot has $70 to spend.
He spends $24.75 on a shirt.

(i) Find $24.75 as a fraction of $70.
Give your answer in its lowest terms.

..... [1]

(ii) The $24.75 is the sale price after reducing the original price by 10%.

Calculate the original price.

$ ..... [3]

(d) After one year, the value of Annie's car had reduced by 20%.
At the end of the second year, the value of Annie's car had reduced by a further 15% of its value at the end of the first year.

(i) Calculate the overall percentage reduction after the two years.

..... % [2]

(ii) After three years the overall percentage reduction in the value of Annie's car is 40.84%.

Calculate the percentage reduction in the third year.

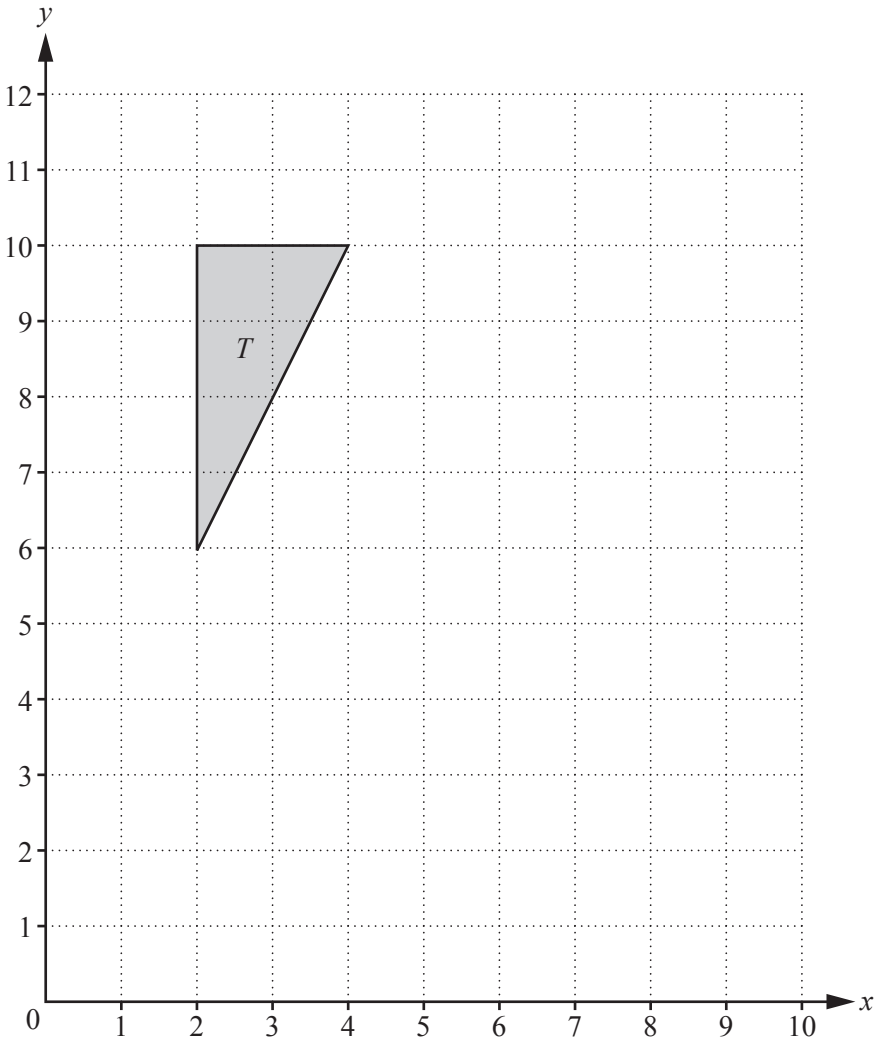
..... % [2]

© UCLES 2017

[Turn over

www.dynamicpapers.com

2 (a)



On the grid, draw the image of

(i) triangle T after translation by the vector $\begin{pmatrix} 6 \\ -5 \end{pmatrix}$, [2]

(ii) triangle T after rotation through 90° anticlockwise with centre (4, 10), [2]

(iii) triangle T after enlargement with scale factor $\frac{1}{2}$, centre (10, 0). [2]

(b) Describe fully the **single** transformation that is represented by the matrix $\begin{pmatrix} 0 & -1 \\ -1 & 0 \end{pmatrix}$.

.....

..... [2]

© UCLES 2017

www.dynamicpapers.com

(c) $\mathbf{M} = \begin{pmatrix} 2 & 3 \\ 2 & 4 \end{pmatrix}$ $\mathbf{N} = \begin{pmatrix} 2 \\ 3 \end{pmatrix}$ $\mathbf{P} = (1 \quad 5)$

(i) Find

(a) **MN**,

$\mathbf{MN} =$ [2]

(b) **NP**,

$\mathbf{NP} =$ [2]

(c) $\mathbf{M}^{-1}$.

$\mathbf{M}^{-1} = \left(\quad \right)$ [2]

(ii) Write down a product of two of the matrices **M**, **N** and **P** which it is not possible to work out.

..... [1]

www.dynamicpapers.com

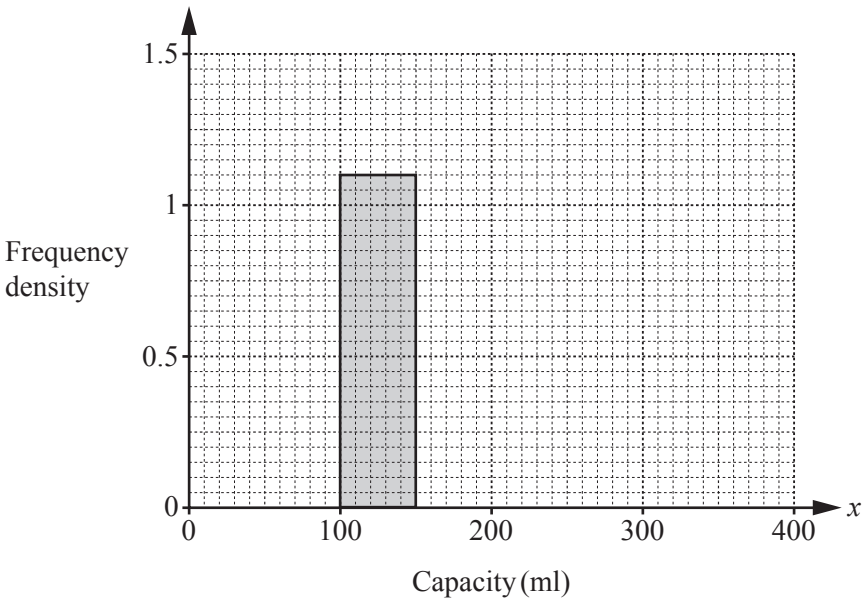
3 **(a)** 200 students estimate the capacity, x millilitres, of a cup.
The results are shown in the frequency table.

Capacity (x ml)	$0 < x \leqslant 100$	$100 < x \leqslant 150$	$150 < x \leqslant 200$	$200 < x \leqslant 250$	$250 < x \leqslant 400$
Frequency	20	55	66	35	24

(i) Calculate an estimate of the mean.

..... ml [4]

(ii) Complete the histogram.



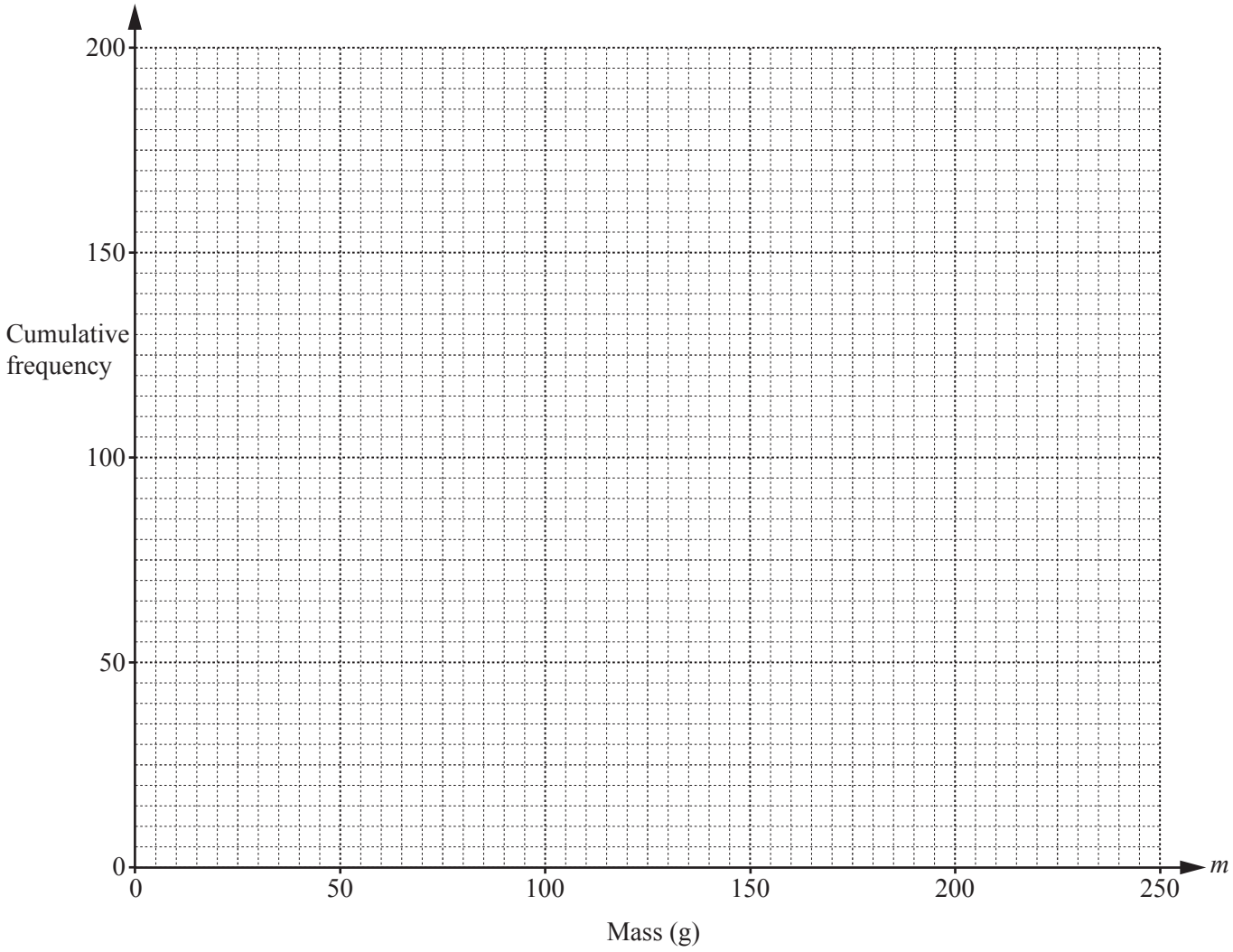
[4]

www.dynamicpapers.com

(b) The 200 students also estimate the mass, m grams, of a small rock.
The results are shown in the cumulative frequency table.

Mass (m grams)	$m \leqslant 50$	$m \leqslant 100$	$m \leqslant 150$	$m \leqslant 200$	$m \leqslant 250$
Cumulative frequency	28	64	104	168	200

(i) On the grid, draw a cumulative frequency diagram.



[3]

(ii) Find

(a) the 65th percentile,

..... g [1]

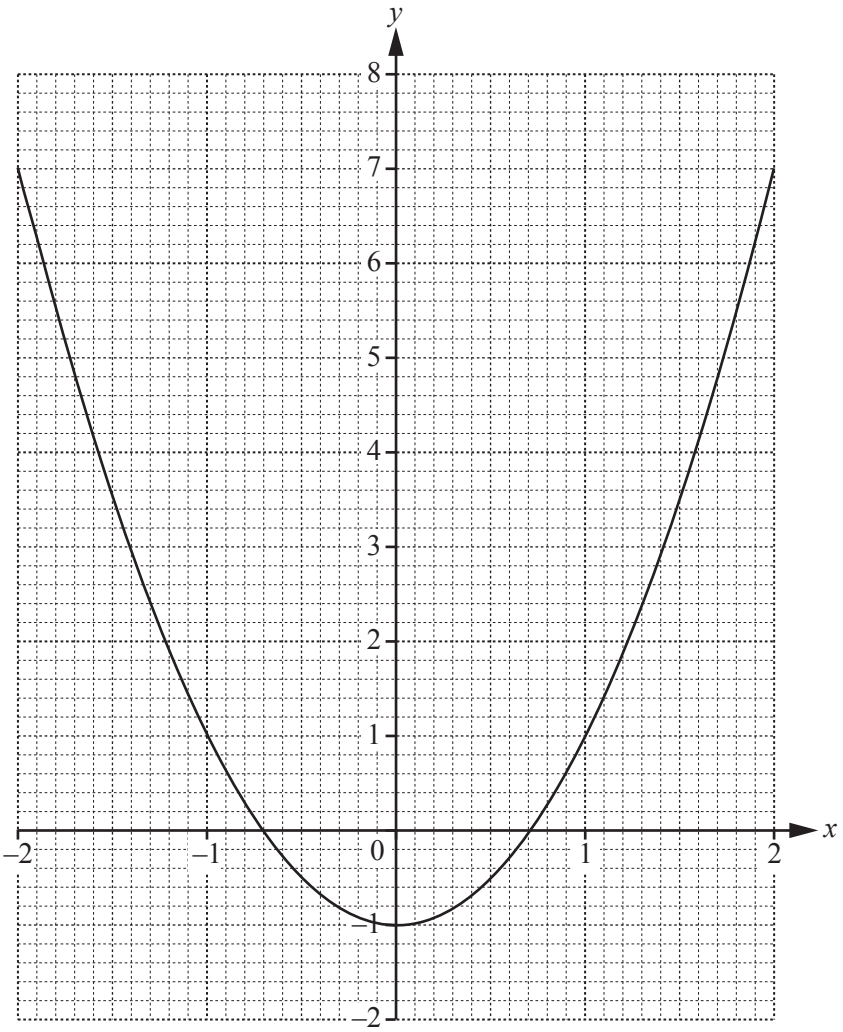
(b) the number of students who estimated more than 75 g.

..... [2]

www.dynamicpapers.com

4 $f(x) = 2x^2 - 1$

The graph of $y = f(x)$, for $-2 \leqslant x \leqslant 2$, is drawn on the grid.



(a) Use the graph to solve the equation $f(x) = 5$.

$x =$ ..... or $x =$ ..... [2]

(b) **(i)** Draw the tangent to the graph of $y = f(x)$ at the point $(-1.5, 3.5)$. [1]

(ii) Use your tangent to estimate the gradient of $y = f(x)$ when $x = -1.5$.

..... [2]

© UCLES 2017

www.dynamicpapers.com

(c) $g(x) = 2^x$

(i) Complete the table for $y = g(x)$.

x	-2	-1	0	1	2
y	0.25	0.5		2	4

[1]

(ii) On the grid opposite, draw the graph of $y = g(x)$ for $-2 \leqslant x \leqslant 2$. [3]

(d) Use your graphs to solve

(i) the equation $f(x) = g(x)$,

$x =$ ..... or $x =$ ..... [2]

(ii) the inequality $f(x) < g(x)$.

..... [1]

(e) **(i)** Write down the three values.

$g(-3) =$ ..... $g(-5) =$ ..... $g(-10) =$ ..... [1]

(ii) Complete the statement.

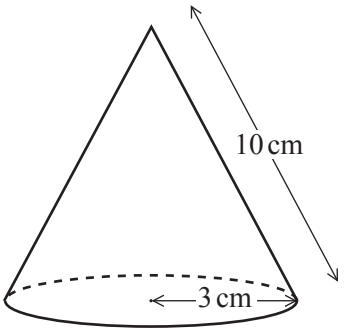
As x decreases, $g(x)$ approaches the value ..... [1]

© UCLES 2017

[Turn over

www.dynamicpapers.com

5



NOT TO SCALE

The diagram shows a hollow cone with radius 3 cm and slant height 10 cm.

(a) (i) Calculate the curved surface area of the cone.

[The curved surface area, A, of a cone with radius r and slant height l is $A = \pi rl$.]

..... cm^2 [2]

(ii) Calculate the perpendicular height of the cone.

..... cm [3]

(iii) Calculate the volume of the cone.

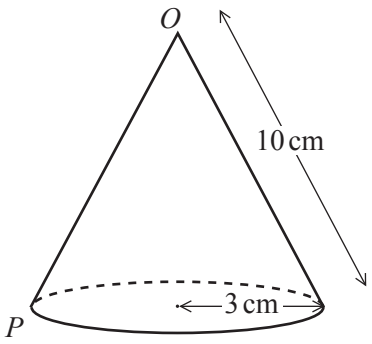
[The volume, V, of a cone with radius r and height h is $V = \frac{1}{3}\pi r^2 h$.]

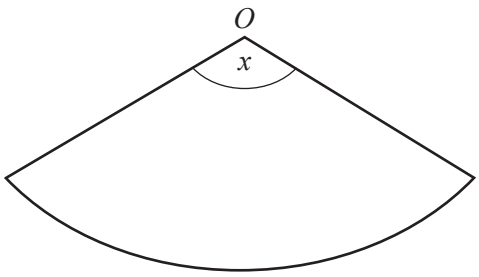
..... cm^3 [2]

© UCLES 2017

www.dynamicpapers.com

(b)





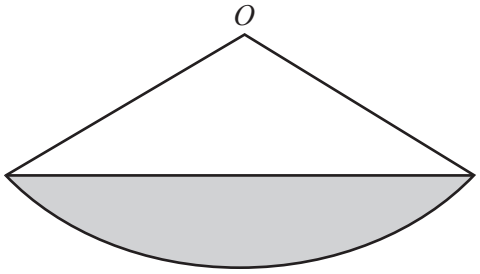
NOT TO SCALE

The cone is cut along the line *OP* and is opened out into a sector as shown in the diagram.

Calculate the sector angle x.

$x =$ ..... [4]

(c)



NOT TO SCALE

The diagram shows the same sector as in **part (b)**.

Calculate the area of the shaded segment.

..... cm^2 [4]

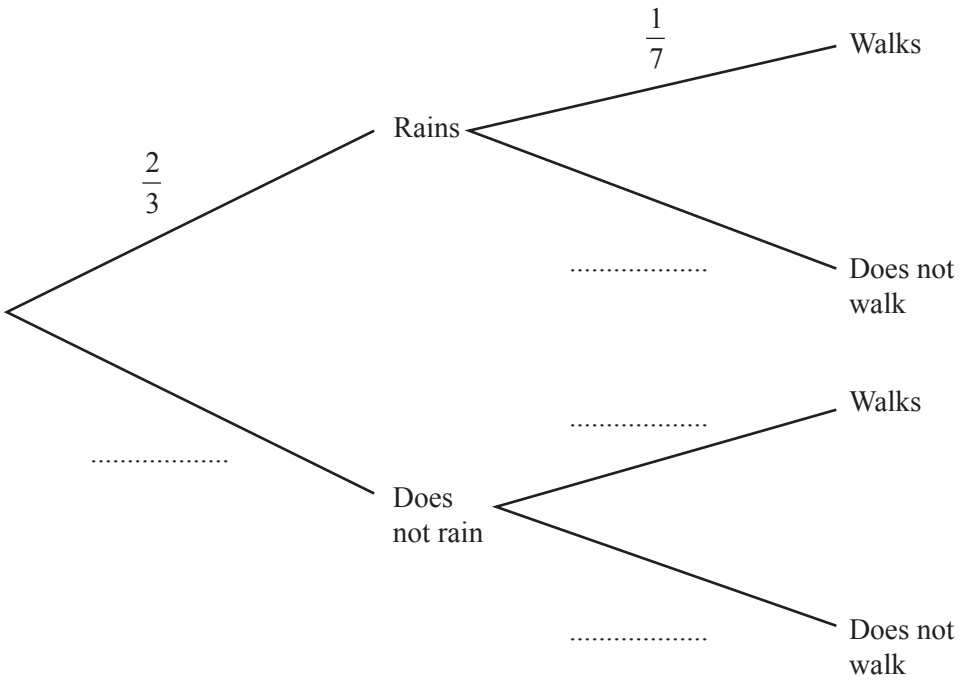
www.dynamicpapers.com

6 Each morning the probability that it rains is $\frac{2}{3}$.

If it rains, the probability that Asha walks to school is $\frac{1}{7}$.

If it does not rain, the probability that Asha walks to school is $\frac{4}{7}$.

(a) Complete the tree diagram.



[2]

(b) Find the probability that it rains and Asha walks to school.

..... [2]

(c) **(i)** Find the probability that Asha does not walk to school.

..... [3]

www.dynamicpapers.com

(ii) Find the expected number of days Asha does not walk to school in a term of 70 days.

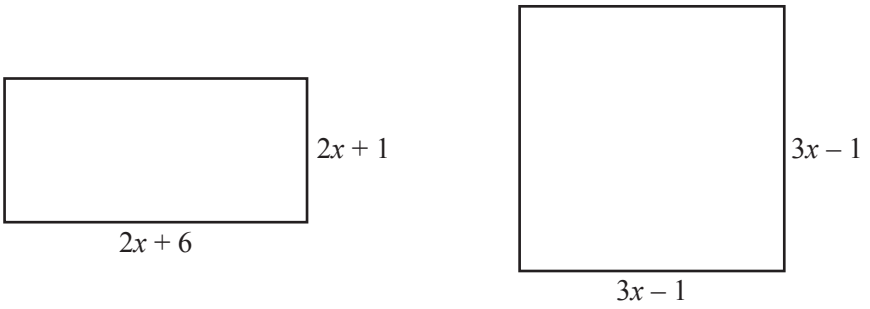
..... [2]

(d) Find the probability that it rains on exactly one morning in a school week of 5 days.

..... [2]

www.dynamicpapers.com

7 **(a)** In this part, all lengths are in centimetres.



(i) Find the value of x when the perimeter of the rectangle is equal to the perimeter of the square.

$x =$ ..... [3]

(ii) Find the value of x when the area of the rectangle is equal to the area of the square.
Show all your working.

$x =$ ..... [7]

© UCLES 2017

www.dynamicpapers.com

(b) (i) Factorise $x^2 + 4x - 5$.

..... [2]

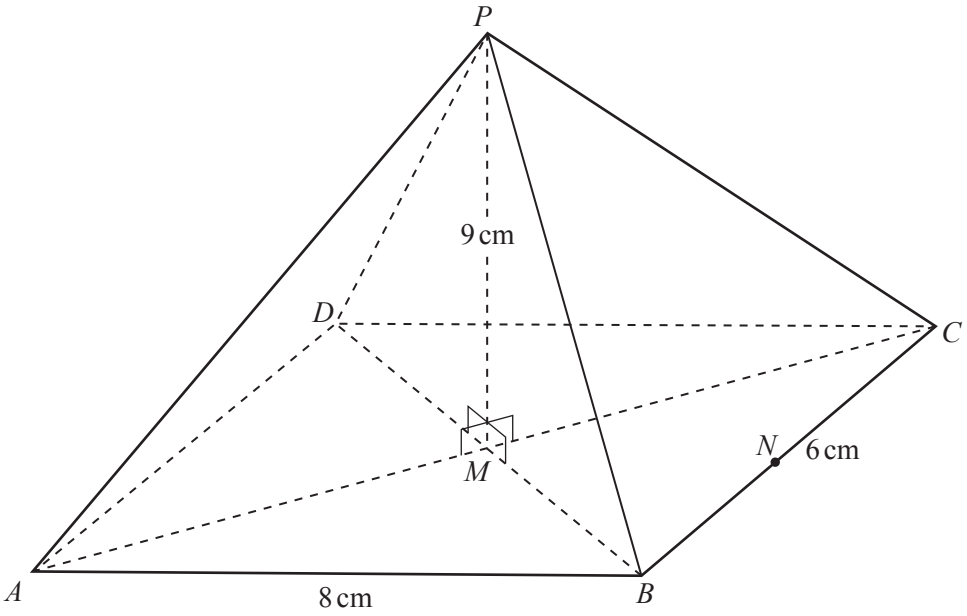
(ii) Solve the equation $\frac{5}{x} - \frac{8}{x+1} = 1$.

Show all your working.

$x =$ ..... or $x =$ ..... [4]

www.dynamicpapers.com

8



The diagram shows a pyramid on a rectangular base $ABCD$.
AC and BD intersect at M and P is vertically above M.
$AB = 8$ cm, $BC = 6$ cm and $PM = 9$ cm.

(a) N is the midpoint of BC.

Calculate angle PNM.

Angle PNM = ... [2]

(b) Show that $BM = 5$ cm.

[1]

www.dynamicpapers.com

(c) Calculate the angle between the edge PB and the base $ABCD$.

..... [2]

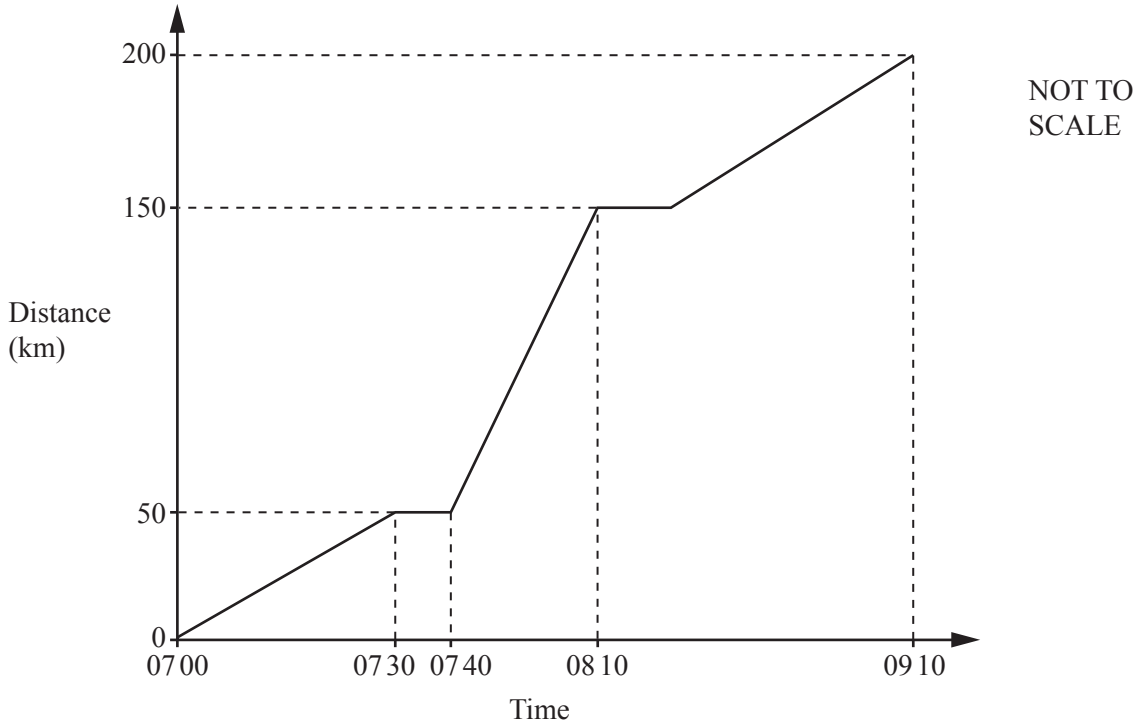
(d) A point X is on PC so that $PX = 7.5$ cm.

Calculate BX.

$BX =$ ..... cm [6]

www.dynamicpapers.com

9 (a)



The distance-time graph shows the journey of a train.

(i) Find the speed of the train between 07 00 and 07 30.

..... km/h [1]

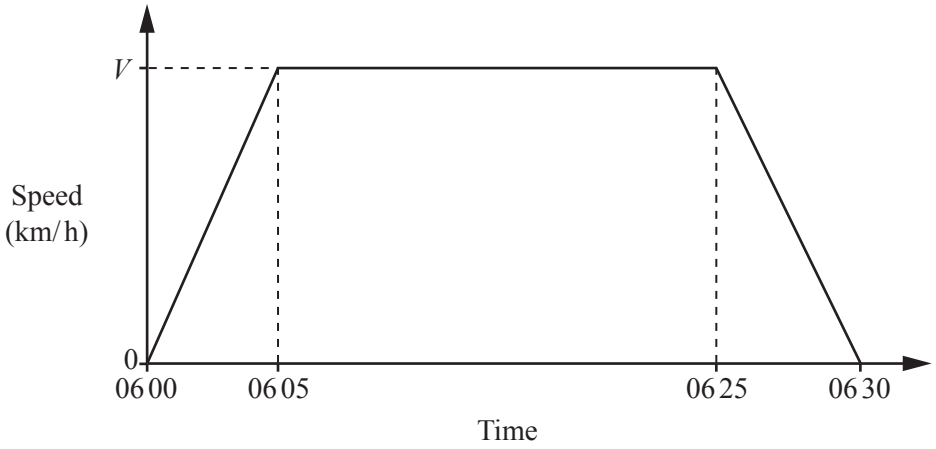
(ii) Find the average speed for the whole journey.

..... km/h [3]

© UCLES 2017

www.dynamicpapers.com

(b)



The speed-time graph shows the first 30 minutes of another train journey.
The distance travelled is 100 km.
The maximum speed of the train is V km/h.

(i) Find the value of V.

$V =$ ..... [3]

(ii) Find the acceleration of the train during the first 5 minutes.
Give your answer in m/s^2.

..... m/s^2 [2]

Question 10 is printed on the next page.

www.dynamicpapers.com

10 $f(x) = 3x - 2$ $g(x) = x^2$ $h(x) = 3^x$

(a) Find $f(-3)$.

..... [1]

(b) Find the value of x when $f(x) = 19$.

$x =$ ..... [2]

(c) Find $fh(2)$.

..... [2]

(d) Find $gf(x) + f(x) + x$.
Give your answer in its simplest form.

..... [3]

(e) Find $f^{-1}(x)$.

$f^{-1}(x) =$ ..... [2]

Permission to reproduce items where third-party owned material protected by copyright is included has been sought and cleared where possible. Every reasonable effort has been made by the publisher (UCLES) to trace copyright holders, but if any items requiring clearance have unwittingly been included, the publisher will be pleased to make amends at the earliest possible opportunity.

To avoid the issue of disclosure of answer-related information to candidates, all copyright acknowledgements are reproduced online in the Cambridge International Examinations Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at www.cie.org.uk after the live examination series.

Cambridge International Examinations is part of the Cambridge Assessment Group. Cambridge Assessment is the brand name of University of Cambridge Local Examinations Syndicate (UCLES), which is itself a department of the University of Cambridge.