



Cambridge IGCSE™

CANDIDATE
NAME

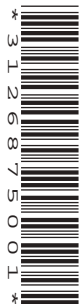
--

CENTRE
NUMBER

--	--	--	--	--

CANDIDATE
NUMBER

--	--	--	--



MATHEMATICS

0580/42

Paper 4 (Extended)

May/June 2020

2 hours 30 minutes

You must answer on the question paper.

You will need: Geometrical instruments

INSTRUCTIONS

- Answer **all** questions.
- Use a black or dark blue pen. You may use an HB pencil for any diagrams or graphs.
- Write your name, centre number and candidate number in the boxes at the top of the page.
- Write your answer to each question in the space provided.
- Do **not** use an erasable pen or correction fluid.
- Do **not** write on any bar codes.
- You should use a calculator where appropriate.
- You may use tracing paper.
- You must show all necessary working clearly.
- Give non-exact numerical answers correct to 3 significant figures, or 1 decimal place for angles in degrees, unless a different level of accuracy is specified in the question.
- For π , use either your calculator value or 3.142.

INFORMATION

- The total mark for this paper is 130.
- The number of marks for each question or part question is shown in brackets [].

This document has **20** pages. Blank pages are indicated.

1 (a) (i) Divide \$24 in the ratio 7 : 5.

\$, \$ [2]

(ii) Write \$24.60 as a fraction of \$2870.
Give your answer in its lowest terms.

..... [2]

(iii) Write \$1.92 as a percentage of \$1.60 .

..... % [1]

(b) In a sale the original prices are reduced by 15%.

(i) Calculate the sale price of a book that has an original price of \$12.

\$ [2]

(ii) Calculate the original price of a jacket that has a sale price of \$38.25 .

\$ [2]

- (c) (i) Dean invests \$500 for 10 years at a rate of 1.7% per year simple interest.

Calculate the total interest earned during the 10 years.

\$ [2]

- (ii) Ollie invests \$200 at a rate of 0.0035% **per day** compound interest.

Calculate the value of Ollie's investment at the end of 1 year.

[1 year = 365 days.]

\$ [2]

- (iii) Edna invests \$500 at a rate of $r\%$ per year compound interest.

At the end of 6 years, the value of Edna's investment is \$559.78 .

Find the value of r .

$r =$ [3]

2 (a) $\mathbf{p} = \begin{pmatrix} 4 \\ 5 \end{pmatrix}$ $\mathbf{q} = \begin{pmatrix} -2 \\ 7 \end{pmatrix}$

(i) Find $2\mathbf{p} + \mathbf{q}$.

$$\left(\quad \quad \right) \quad [2]$$

(ii) Find $|\mathbf{p}|$.

..... [2]

(b) A is the point $(4, 1)$ and $\overrightarrow{AB} = \begin{pmatrix} -3 \\ 1 \end{pmatrix}$.

Find the coordinates of B .

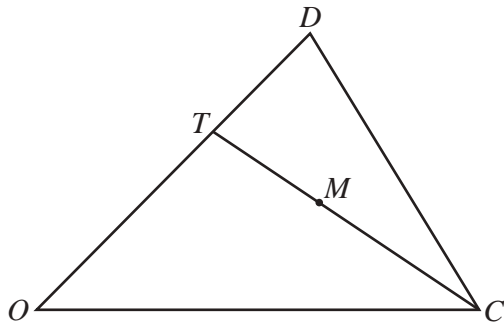
(..... ,) [1]

(c) The line $y = 3x - 2$ crosses the y -axis at G .

Write down the coordinates of G .

(..... ,) [1]

(d)

NOT TO
SCALE

In the diagram, O is the origin, $OT = 2TD$ and M is the midpoint of TC .
 $\vec{OC} = \mathbf{c}$ and $\vec{OD} = \mathbf{d}$.

Find the position vector of M .

Give your answer in terms of \mathbf{c} and \mathbf{d} in its simplest form.

..... [3]

- 3 The speed, v km/h, of each of 200 cars passing a building is measured. The table shows the results.

Speed (v km/h)	$0 < v \leq 20$	$20 < v \leq 40$	$40 < v \leq 45$	$45 < v \leq 50$	$50 < v \leq 60$	$60 < v \leq 80$
Frequency	16	34	62	58	26	4

- (a) Calculate an estimate of the mean.

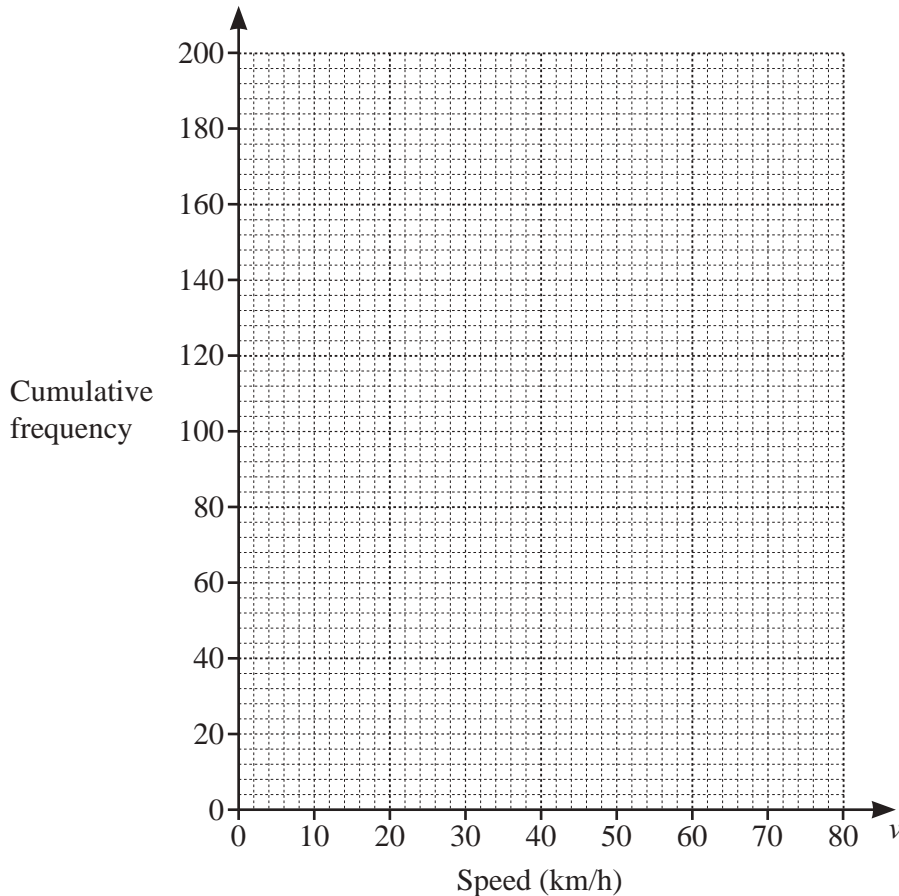
..... km/h [4]

- (b) (i) Use the frequency table to complete the cumulative frequency table.

Speed (v km/h)	$v \leq 20$	$v \leq 40$	$v \leq 45$	$v \leq 50$	$v \leq 60$	$v \leq 80$
Cumulative frequency	16	50			196	200

[1]

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



[3]

(iii) Use your diagram to find an estimate of

(a) the upper quartile,

..... km/h [1]

(b) the number of cars with a speed greater than 35 km/h.

..... [2]

(c) Two of the 200 cars are chosen at random.

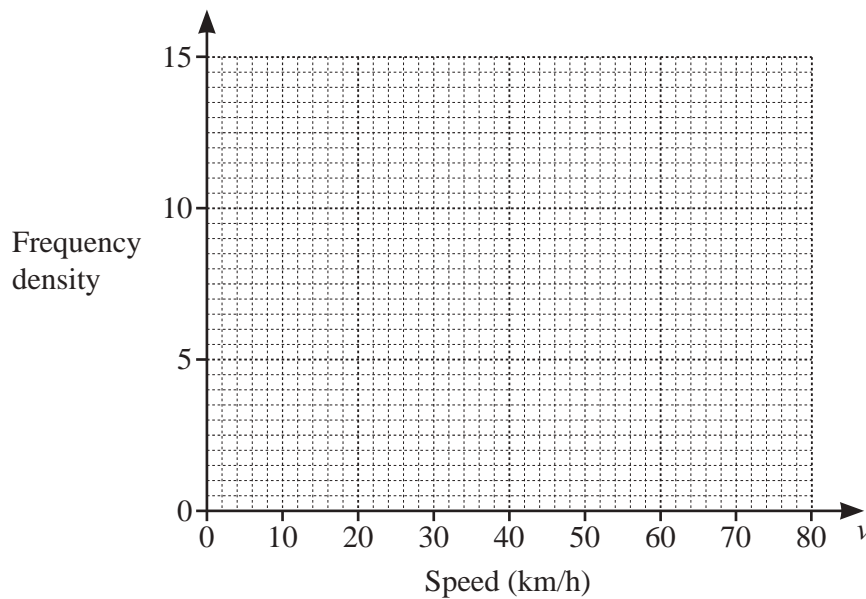
Find the probability that they both have a speed greater than 50 km/h.

..... [2]

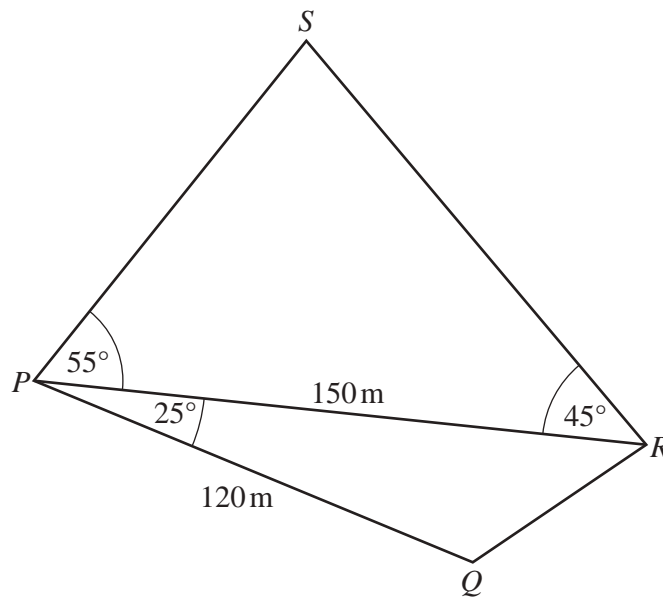
(d) A new frequency table is made by combining intervals.

Speed (v km/h)	$0 < v \leq 40$	$40 < v \leq 50$	$50 < v \leq 80$
Frequency	50	120	30

On the grid, draw a histogram to show the information in this table.



[3]



NOT TO
SCALE

The diagram shows two triangles.

(a) Calculate QR .

$$QR = \dots\dots\dots \text{ m [3]}$$

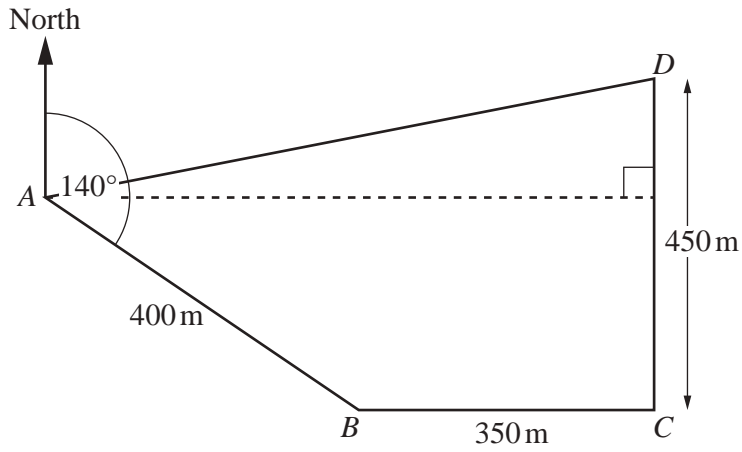
(b) Calculate RS .

$$RS = \dots\dots\dots \text{ m [4]}$$

(c) Calculate the total area of the two triangles.

..... m² [3]

5



NOT TO SCALE

The diagram shows a field $ABCD$.
 The bearing of B from A is 140° .
 C is due east of B and D is due north of C .
 $AB = 400$ m, $BC = 350$ m and $CD = 450$ m.

(a) Find the bearing of D from B .

..... [2]

(b) Calculate the distance from D to A .

..... m [6]

(c) Jono runs around the field from A to B , B to C , C to D and D to A .
He runs at a speed of 3 m/s.

Calculate the total time Jono takes to run around the field.
Give your answer in minutes and seconds, correct to the nearest second.

..... min s [4]

6 $f(x) = 3x + 2$ $g(x) = x^2 + 1$ $h(x) = 4^x$

(a) Find $h(4)$.

..... [1]

(b) Find $fg(1)$.

..... [2]

(c) Find $gf(x)$ in the form $ax^2 + bx + c$.

..... [3]

(d) Find x when $f(x) = g(7)$.

$x =$ [2]

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

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

(f) Find $\frac{g(x)}{f(x)} + x$.

Give your answer as a single fraction, in terms of x , in its simplest form.

..... [3]

(g) Find x when $h^{-1}(x) = 2$.

$x =$ [1]

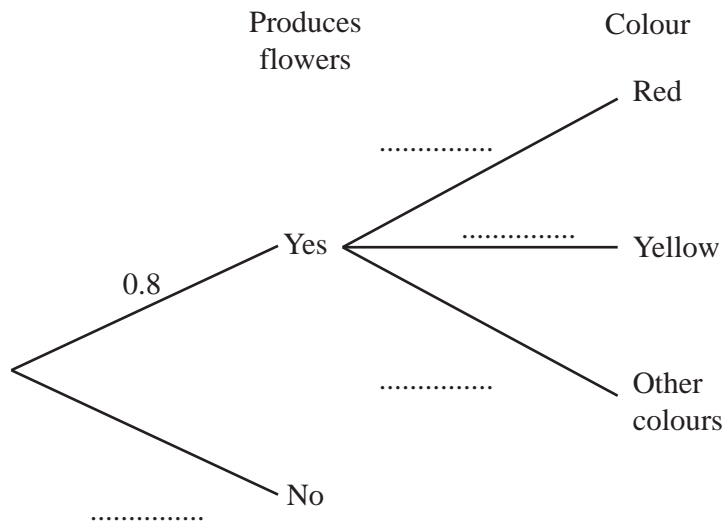
7 Tanya plants some seeds.
 The probability that a seed will produce flowers is 0.8 .
 When a seed produces flowers, the probability that the flowers are red is 0.6 and the probability that the flowers are yellow is 0.3 .

(a) Tanya has a seed that produces flowers.

Find the probability that the flowers are not red and not yellow.

..... [1]

(b) (i) Complete the tree diagram.



[2]

(ii) Find the probability that a seed chosen at random produces red flowers.

..... [2]

(iii) Tanya chooses a seed at random.

Find the probability that this seed does not produce red flowers and does not produce yellow flowers.

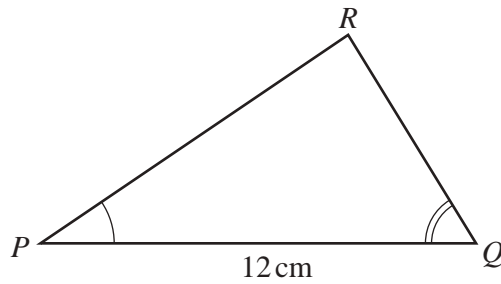
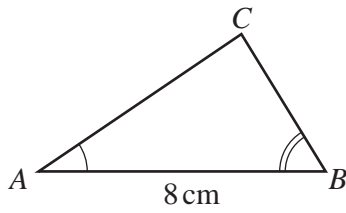
..... [3]

(c) Two of the seeds are chosen at random.

Find the probability that one produces flowers and one does not produce flowers.

..... [3]

8 (a)



NOT TO SCALE

Triangle ABC is mathematically similar to triangle PQR .
The area of triangle ABC is 16 cm^2 .

(i) Calculate the area of triangle PQR .

..... cm^2 [2]

(ii) The triangles are the cross-sections of prisms which are also mathematically similar.
The volume of the smaller prism is 320 cm^3 .

Calculate the length of the larger prism.

..... cm [3]

- (b) A cylinder with radius 6 cm and height h cm has the same volume as a sphere with radius 4.5 cm.

Find the value of h .

[The volume, V , of a sphere with radius r is $V = \frac{4}{3}\pi r^3$.]

$$h = \dots\dots\dots [3]$$

- (c) A solid metal cube of side 20 cm is melted down and made into 40 solid spheres, each of radius r cm.

Find the value of r .

[The volume, V , of a sphere with radius r is $V = \frac{4}{3}\pi r^3$.]

$$r = \dots\dots\dots [3]$$

- (d) A solid cylinder has radius x cm and height $\frac{7x}{2}$ cm.

The surface area of a sphere with radius R cm is equal to the total surface area of the cylinder.

Find an expression for R in terms of x .

[The surface area, A , of a sphere with radius r is $A = 4\pi r^2$.]

$$R = \dots\dots\dots [3]$$

9 (a) (i) Write $x^2 + 8x - 9$ in the form $(x+k)^2 + h$.

..... [2]

(ii) Use your answer to **part (a)(i)** to solve the equation $x^2 + 8x - 9 = 0$.

$x = \dots\dots\dots$ or $x = \dots\dots\dots$ [2]

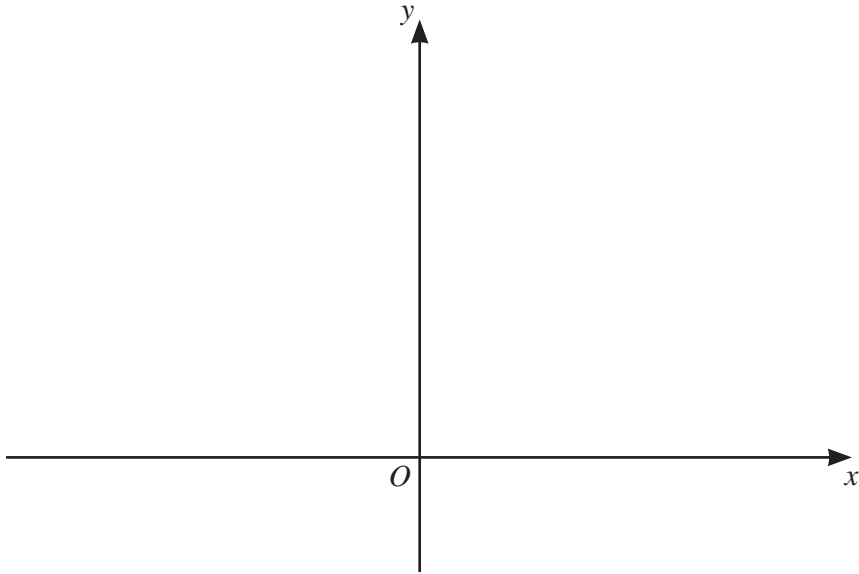
(b) The solutions of the equation $x^2 + bx + c = 0$ are $\frac{-7 + \sqrt{61}}{2}$ and $\frac{-7 - \sqrt{61}}{2}$.

Find the value of b and the value of c .

$b = \dots\dots\dots$

$c = \dots\dots\dots$ [3]

(c) (i)



On the diagram,

(a) sketch the graph of $y = (x-1)^2$, [2]

(b) sketch the graph of $y = \frac{1}{2}x + 1$. [2]

(ii) The graphs of $y = (x-1)^2$ and $y = \frac{1}{2}x + 1$ intersect at A and B .

Find the length of AB .

$AB = \dots\dots\dots$ [7]

Question 10 is printed on the next page.

10 (a) $y = x^4 - 4x^3$

(i) Find the value of y when $x = -1$.

$$y = \dots\dots\dots [2]$$

(ii) Find the two stationary points on the graph of $y = x^4 - 4x^3$.

(..... ,)

(..... ,) [6]

(b) $y = x^p + 2x^q$

$\frac{dy}{dx} = 11x^{10} + 10x^4$, where $\frac{dy}{dx}$ is the derived function.

Find the value of p and the value of q .

$$p = \dots\dots\dots$$

$$q = \dots\dots\dots [2]$$

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 Assessment International Education Copyright Acknowledgements Booklet. This is produced for each series of examinations and is freely available to download at www.cambridgeinternational.org after the live examination series.

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