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Cambridge Assessment International Education

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CANDIDATE NAME									
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4684519284

MATHEMATICS **0580/21**

Paper 2 (Extended) **May/June 2020**

1 hour 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 70.
- The number of marks for each question or part question is shown in brackets [ ].

This document has **16** pages. Blank pages are indicated.

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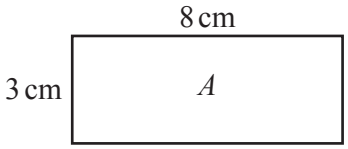
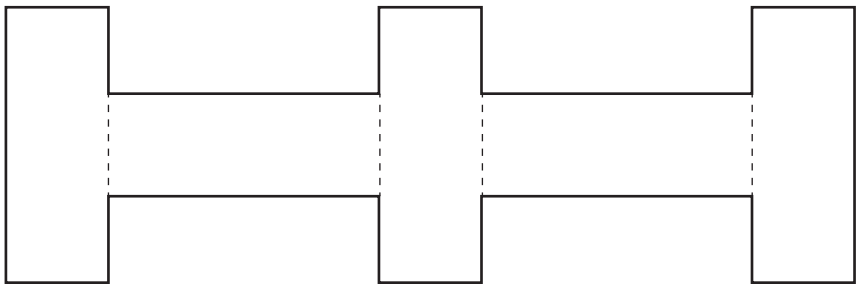
1 Rectangle A measures 3 cm by 8 cm.



NOT TO SCALE

Five rectangles congruent to A are joined to make a shape.



NOT TO SCALE

Work out the perimeter of this shape.

..... cm [2]

2 Find the highest **odd** number that is a factor of 60 and a factor of 90.

..... [1]

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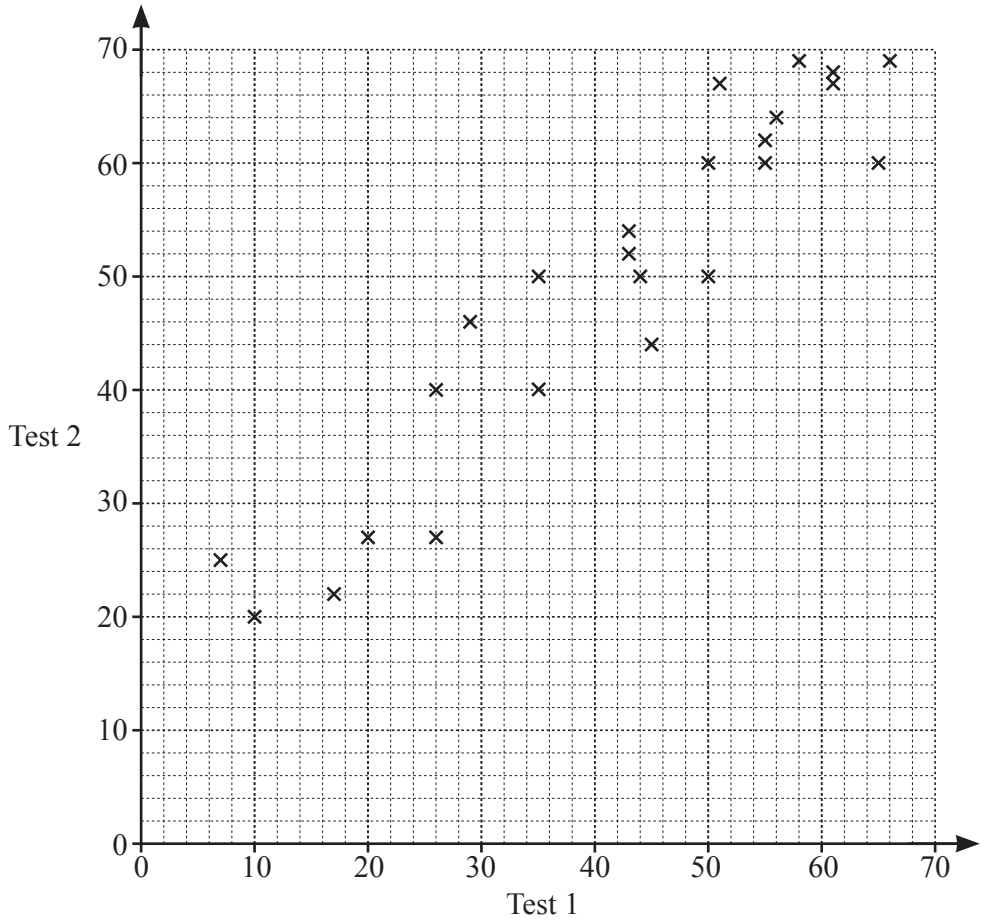
3 Mrs Salaman gives her class two mathematics tests.
The scatter diagram shows information about the marks each student scored.



(a) Write down the highest mark scored on test 1.

..... [1]

(b) Write down the type of correlation shown in the scatter diagram.

..... [1]

(c) Draw a line of best fit on the scatter diagram. [1]

(d) Hamish scored a mark of 40 on test 1.
He was absent for test 2.

Use your line of best fit to find an estimate for his mark on test 2.

..... [1]

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4 A bag contains blue, red, yellow and green balls only.
A ball is taken from the bag at random.
The table shows some information about the probabilities.

Colour	Blue	Red	Yellow	Green
Probability	0.15	0.2		0.43

(a) Complete the table.

[2]

(b) Abdul takes a ball at random and replaces it in the bag.
He does this 200 times.

Find how many times he expects to take a red ball.

..... [1]

5 **(a)** The nth term of a sequence is $60 - 8n$.

Find the largest number in this sequence.

..... [1]

(b) Here are the first five terms of a different sequence.

12 19 26 33 40

Find an expression for the nth term of this sequence.

..... [2]

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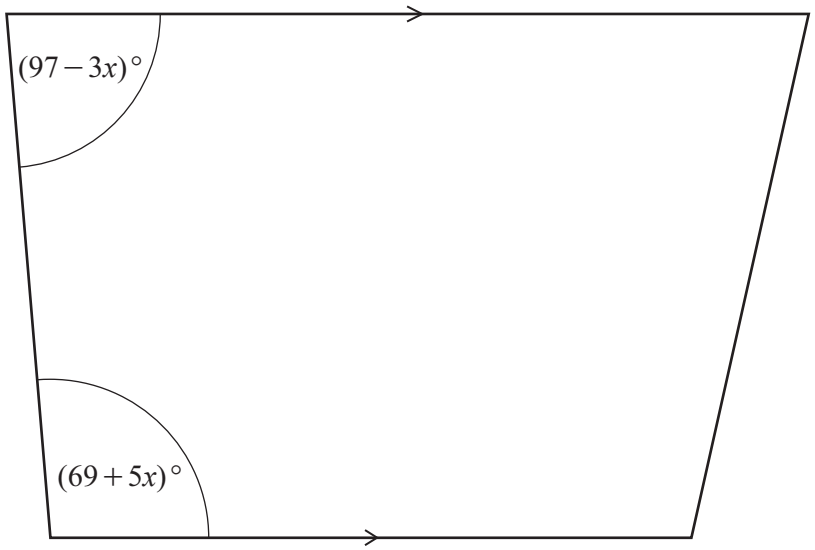
6 The diagram shows a trapezium.



NOT TO SCALE

Work out the value of x.

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

7 $234 = 2 \times 3^2 \times 13$ $1872 = 2^4 \times 3^2 \times 13$ $234 \times 1872 = 438\,048$

Use this information to write 438 048 as a product of its prime factors.

..... [1]

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8 **Without using a calculator**, work out $\left(2\frac{1}{3}-\frac{7}{8}\right)\times\frac{6}{25}$.

You must show all your working and give your answer as a fraction in its simplest form.

..... [4]

9 Factorise completely.

(a) $21a^2+28ab$

..... [2]

(b) $20x^2-45y^2$

..... [3]

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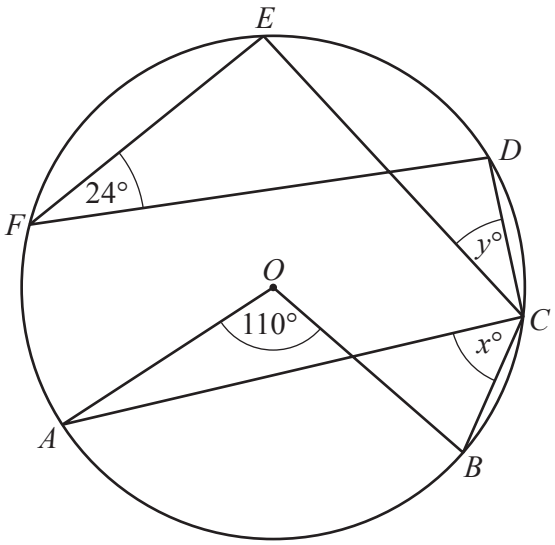
10



NOT TO SCALE

Points A, B, C, D, E and F lie on the circle, centre O.

Find the value of x and the value of y.

$x =$ .....

$y =$ ..... [2]

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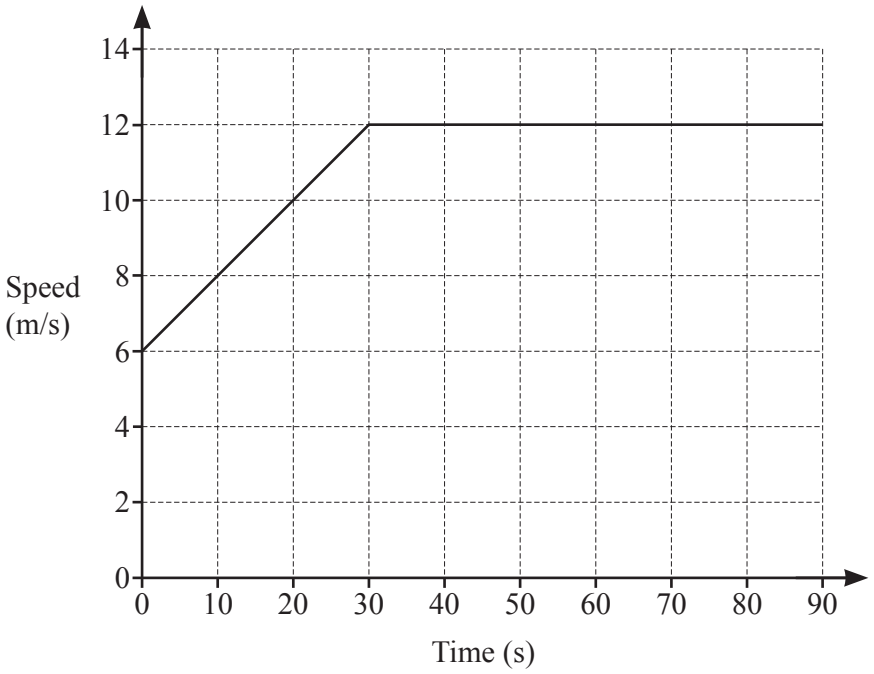

The diagram shows the speed–time graph for 90 seconds of a journey.

Calculate the total distance travelled during the 90 seconds.

..... m [3]

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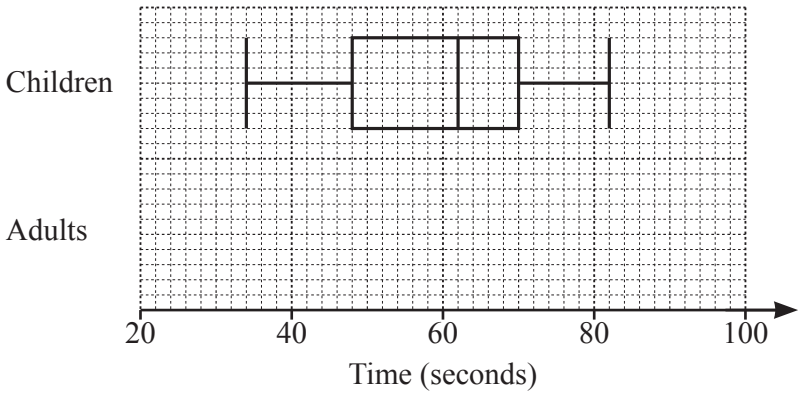
12 Gemma records the times, in seconds, taken for a group of children and a group of adults to complete a puzzle.
The box-and-whisker plot shows information about the times taken for the children to complete the puzzle.



(a) Find the interquartile range of the times taken for the children to complete the puzzle.

..... seconds [2]

(b) The table shows some information about the times, in seconds, taken for the adults to complete the puzzle.

Minimum	Lower quartile	Median	Upper quartile	Maximum
28	42	58	70	75

On the grid above, draw the box-and-whisker plot for the adults. [2]

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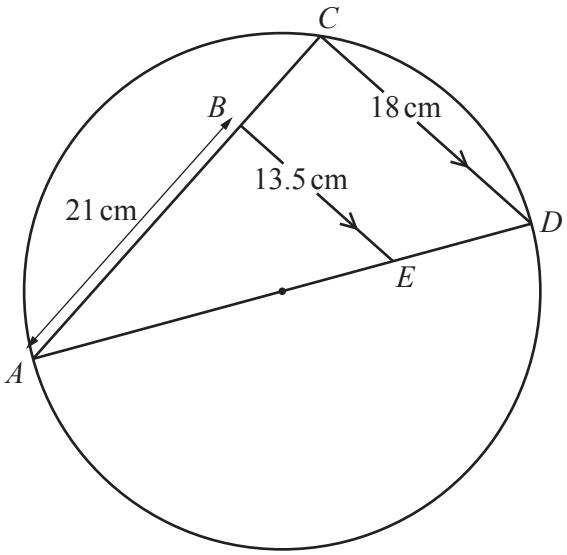
13



NOT TO SCALE

C lies on a circle with diameter *AD*.
B lies on *AC* and *E* lies on *AD* such that *BE* is parallel to *CD*.
AB = 21 cm, *CD* = 18 cm and *BE* = 13.5 cm.

Work out the radius of the circle.

..... cm [5]

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14 **(a)** $f(x) = 4x + 3$ $g(x) = 5x - 4$

$fg(x) = 20x + p$

Find the value of p.

$p =$ ..... [2]

(b) $h(x) = \dfrac{5x - 1}{3}$

Find $h^{-1}(x)$.

$h^{-1}(x) =$ ..... [3]

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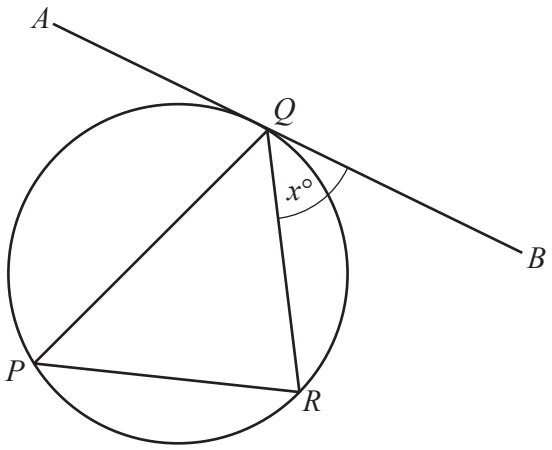
15



NOT TO SCALE

P, R and Q are points on the circle.
AB is a tangent to the circle at Q.
QR bisects angle PQB.
Angle $BQR = x°$ and $x < 60$.

Use this information to show that triangle PQR is an isosceles triangle.
Give a geometrical reason for each step of your work.

[3]

16 m is inversely proportional to the square of $(p - 1)$.
When $p = 4$, $m = 5$.

Find m when $p = 6$.

$m =$ ..... [3]

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17 (a) (i) $\mathbf{m} = \begin{pmatrix} 5 \\ 7 \end{pmatrix}$

Find $3\mathbf{m}$.

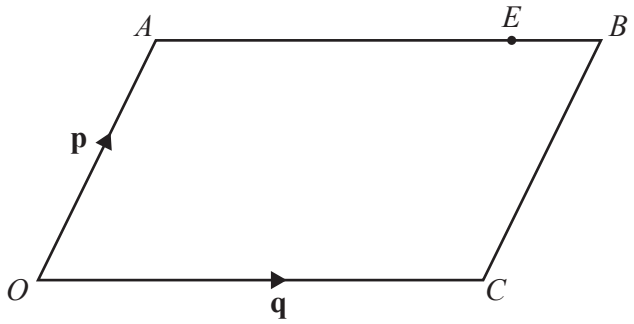
$\begin{pmatrix} \quad \\ \quad \end{pmatrix}$ [1]

(ii) $\overrightarrow{VW} = \begin{pmatrix} 10 \\ -24 \end{pmatrix}$

Find $\left|\overrightarrow{VW}\right|$.

..... [2]

(b)



NOT TO SCALE

$OABC$ is a parallelogram.
$\overrightarrow{OA} = \mathbf{p}$ and $\overrightarrow{OC} = \mathbf{q}$.
E is the point on AB such that $AE : EB = 3 : 1$.

Find $\overrightarrow{OE}$, in terms of $\mathbf{p}$ and $\mathbf{q}$, in its simplest form.

$\overrightarrow{OE} =$ ..... [2]

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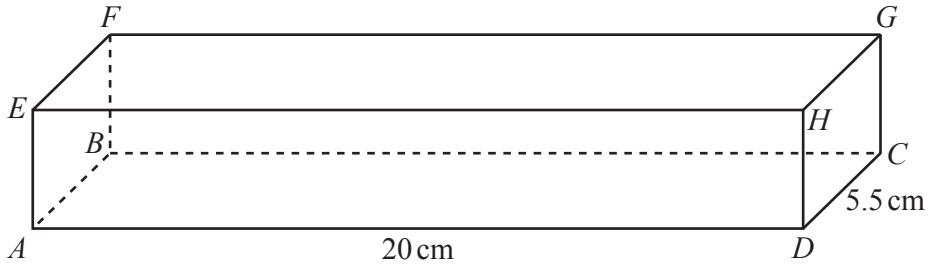
18 $P = 2(w + h)$

$w = 12$ correct to the nearest whole number.
$h = 4$ correct to the nearest whole number.

Work out the upper bound for the value of P.

..... [2]

19



NOT TO SCALE

The diagram shows cuboid $ABCDEFGH$ of length 20 cm and width 5.5 cm.
The volume of the cuboid is 495 cm^3.

Find the angle between the line AG and the base of the cuboid $ABCD$.

..... [5]

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20 The curve $y = x^2 - 2x + 1$ is drawn on a grid.
A line is drawn on the same grid.
The points of intersection of the line and the curve are used to solve the equation $x^2 - 7x + 5 = 0$.

Find the equation of the line in the form $y = mx + c$.

$y =$ ..... [1]

21 Expand and simplify $(x + 3)(x - 5)(3x - 1)$.

..... [3]

Question 22 is printed on the next page.

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22 Find the area of a regular hexagon with side length 7.4 cm.

..... cm^2 [3]

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