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MATHEMATICS (US)

0444/21

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, center 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.
- Calculators must **not** be used in this paper.
- You may use tracing paper.
- You must show all necessary work clearly.
- All answers should be given in their simplest form.

INFORMATION

- The total mark for this paper is 70.
- The number of marks for each question or part question is shown in parentheses [].

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

Formula List

For the equation

$$ax^2 + bx + c = 0$$

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

Lateral surface area, A , of cylinder of radius r , height h .

$$A = 2\pi rh$$

Lateral surface area, A , of cone of radius r , sloping edge l .

$$A = \pi rl$$

Surface area, A , of sphere of radius r .

$$A = 4\pi r^2$$

Volume, V , of pyramid, base area A , height h .

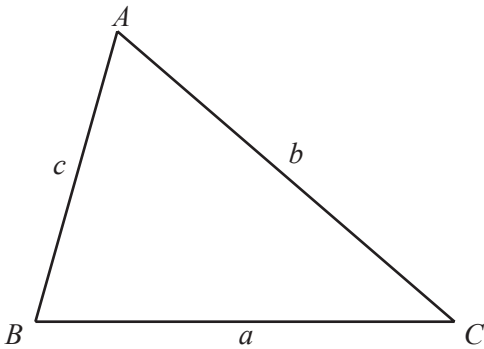
$$V = \frac{1}{3}Ah$$

Volume, V , of cone of radius r , height h .

$$V = \frac{1}{3}\pi r^2 h$$

Volume, V , of sphere of radius r .

$$V = \frac{4}{3}\pi r^3$$

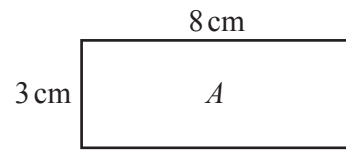


$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 + c^2 - 2bc \cos A$$

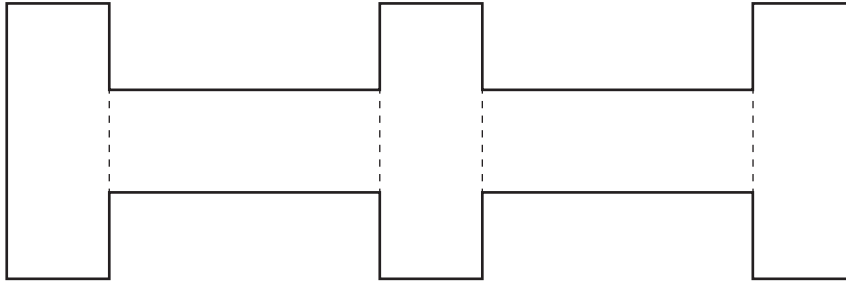
$$\text{Area} = \frac{1}{2}bc \sin A$$

- 1 Rectangle A measures 3 cm by 8 cm.



NOT TO
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Five rectangles congruent to A are joined to make a shape.



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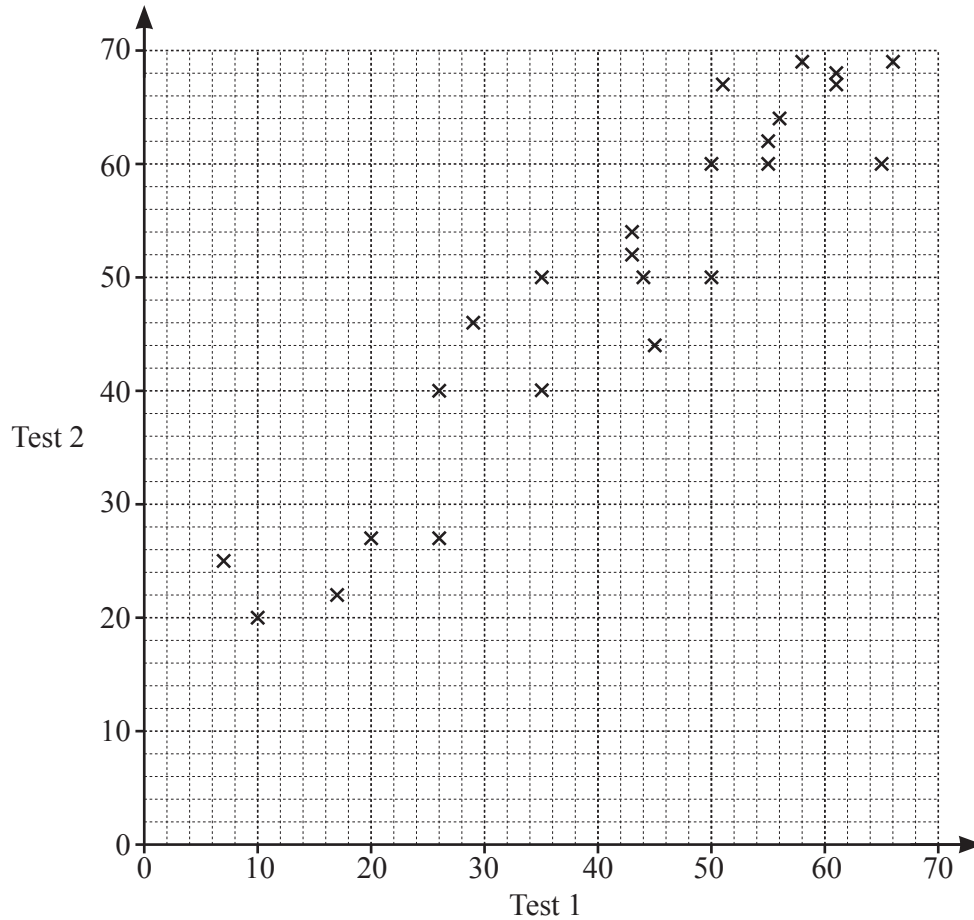
Work out the perimeter of this shape.

..... cm [2]

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

..... [1]

- 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]

- 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.

Color	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 n th term of a sequence is $60 - 8n$.

Find the largest number in this sequence.

..... [1]

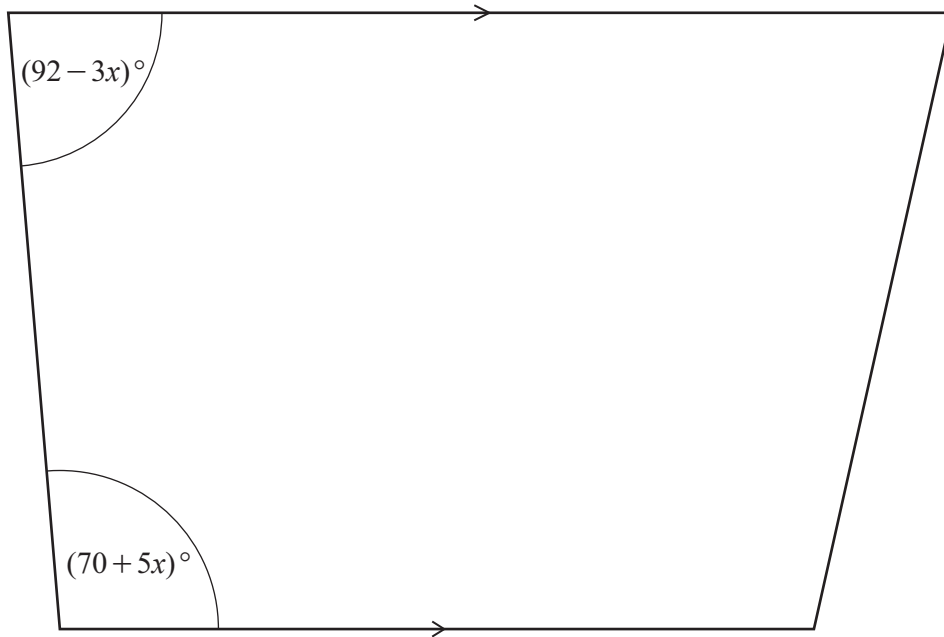
- (b) Here are the first five terms of a different sequence.

12 19 26 33 40

Find an expression for the n th term of this sequence.

..... [2]

- 6 The diagram shows a trapezoid.



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Work out the value of x .

$$x = \dots\dots\dots [3]$$

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.

$$\dots\dots\dots [1]$$

8 Work out $\left(2\frac{1}{3} - \frac{7}{8}\right) \times \frac{6}{25}$.

Give your answer as a fraction in its simplest form.

..... [4]

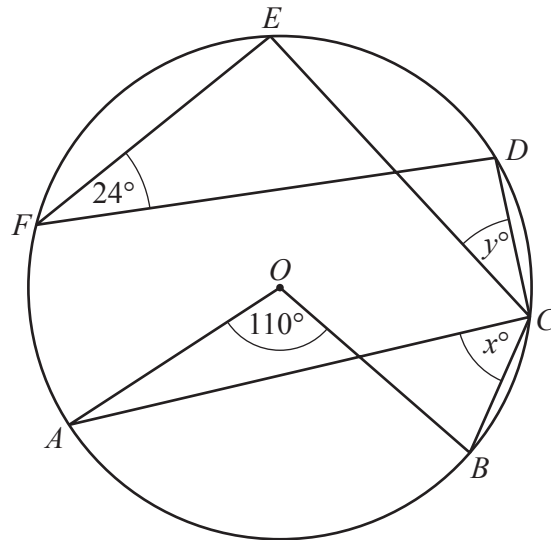
9 Factor completely.

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

..... [2]

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

..... [3]



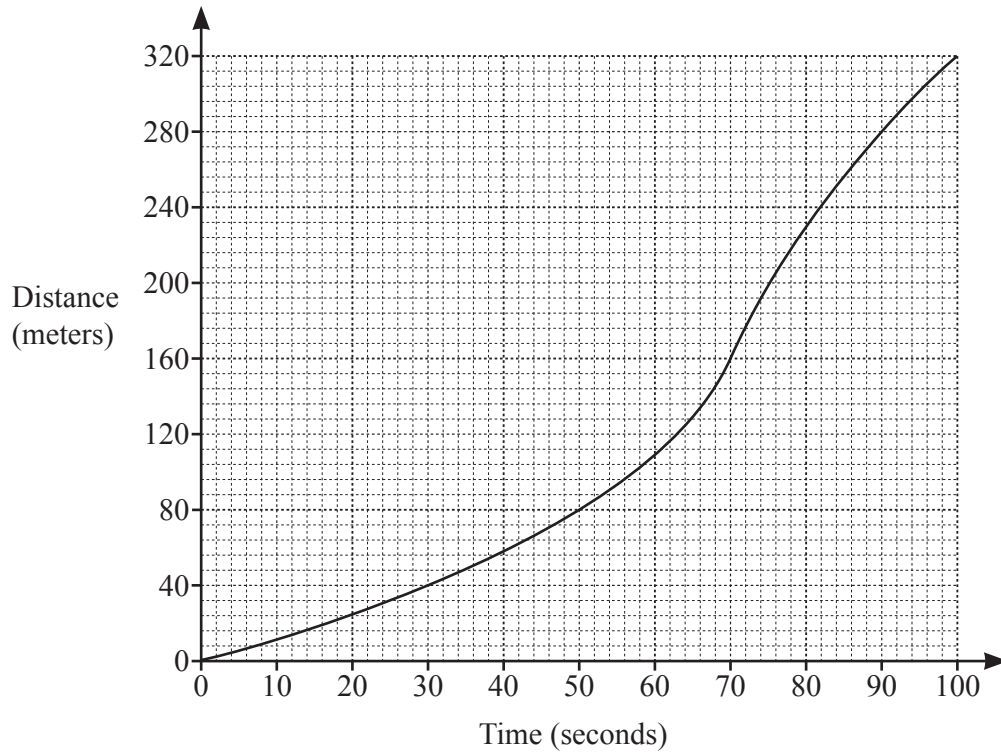
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SCALE

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

Find the value of x and the value of y .

$$x = \dots\dots\dots$$

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



The diagram shows the distance traveled by a cyclist during the first 100 seconds of her journey.

(a) Work out her average speed.

..... m/s [1]

(b) Find an estimate of the speed of the cyclist 60 seconds after she started.

..... m/s [3]

12 19 11 13 10 12 19 14 15 19 13

The list shows 10 test scores.

Find

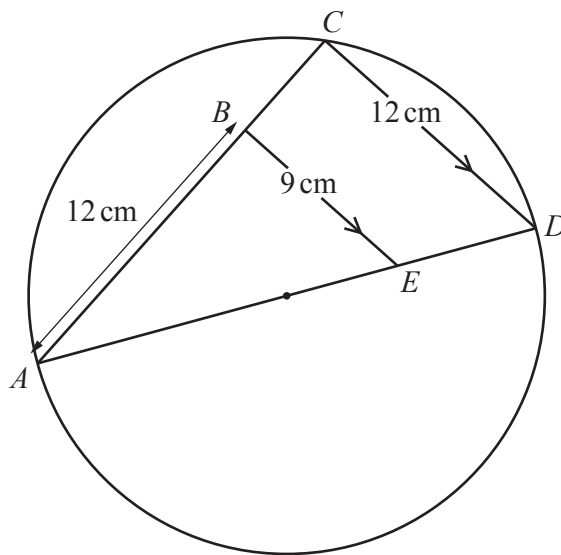
(a) the mode,

..... [1]

(b) the median.

..... [2]

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 .
 $AB = 12$ cm, $CD = 12$ cm and $BE = 9$ cm.

Work out the radius of the circle.

..... cm [5]

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

$$f(g(x)) = 20x + p$$

Find the value of p .

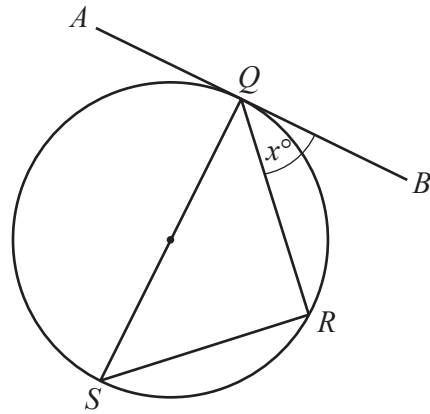
$$p = \dots\dots\dots [2]$$

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

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

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

15



NOT TO SCALE

Q , R and S are points on the circle.
 QS is a diameter.
 AB is a tangent to the circle at Q .
 Angle $BQR = x^\circ$.

Show that angle $QSR = x^\circ$.
 Give a reason for each step of your work.

.....

.....

..... [3]

16 m varies inversely as the square of $(p - 1)$.
 When $p = 4$, $m = 5$.

Find m when $p = 2$.

$m = \dots\dots\dots$ [3]

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

Find $3\mathbf{m}$.

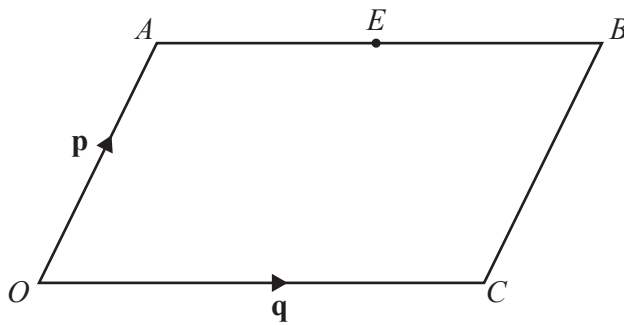
$\left(\quad \right) [1]$

(ii) The magnitude of the vector $\begin{pmatrix} p \\ 12 \end{pmatrix}$ is 13.

Find the positive value of p .

$p = \dots\dots\dots [2]$

(b)



NOT TO SCALE

$OACB$ is a parallelogram.

$\vec{OA} = \mathbf{p}$ and $\vec{OC} = \mathbf{q}$.

E is the midpoint of AB .

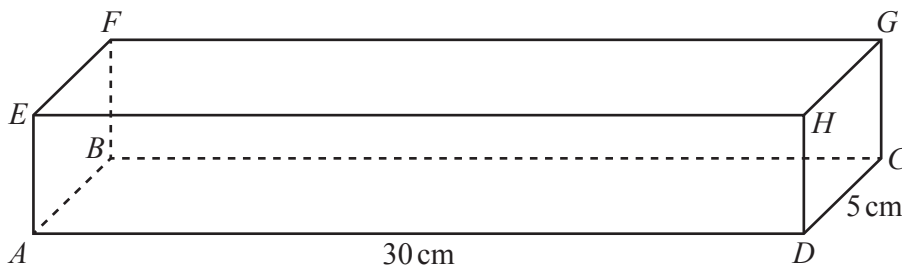
Find \vec{OE} in terms of \mathbf{p} and \mathbf{q} .

$\vec{OE} = \dots\dots\dots [2]$

18 Simplify $\sqrt{250} + \sqrt{40}$.

..... [2]

19



NOT TO SCALE

The diagram shows a solid cuboid $ABCDEFGH$ of length 30 cm and width 5 cm. The volume of the cuboid is 600 cm^3 .

Find the total surface area of the cuboid.

..... cm^2 [4]

20 Simplify. $\frac{x - 8 - ax + 8a}{x^2 - 15x + 56}$

..... [5]

21 The area of a regular hexagon with side length 8 cm is $k\sqrt{3}$ cm².

Find the value of k .

$k =$ [3]

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