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MATHEMATICS (US)

0444/23

Paper 2 (Extended)

October/November 2017

1 hour 30 minutes

Candidates answer on the Question Paper.

Additional Materials: Geometrical instruments

READ THESE INSTRUCTIONS FIRST

Write your Center 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.

CALCULATORS MUST NOT BE USED IN THIS PAPER.

All answers should be given in their simplest form.

If work is needed for any question it must be shown in the space provided.

The number of points is given in parentheses [] at the end of each question or part question.

The total of the points for this paper is 70.

This document consists of **12** printed pages.

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 .

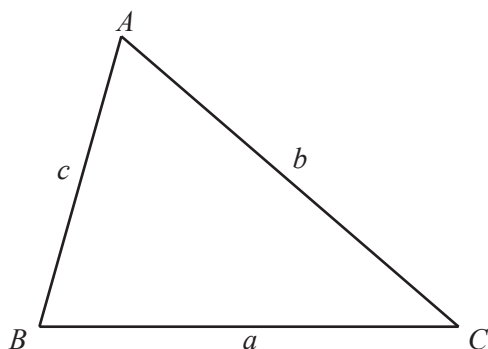
$$V = \frac{1}{3}Ah$$

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 Ahmed drives his car from London to Cambridge.
He leaves London at 07 45 and arrives in Cambridge at 10 17.

Work out the time, in hours and minutes, that he takes to drive from London to Cambridge.

..... h min [1]

- 2 Work out. $\sqrt{2^3 + 1}$

..... [1]

- 3 Write \$4 as a percentage of \$80.

..... % [1]

- 4 A quadrilateral has one line of symmetry and no rotational symmetry.
Write down the name of this quadrilateral.

..... [1]

- 5 Factor completely. $18x + 27y$

..... [1]

6 $(\sqrt[3]{10})^2 = 10^p$

Find the value of p .

$p = \dots\dots\dots [1]$

7 The bearing of Q from P is 055° .

Find the bearing of P from Q .

$\dots\dots\dots [2]$

8 Work out $3.6 \times 10^8 + 5.4 \times 10^9$.
Give your answer in scientific notation.

$\dots\dots\dots [2]$

9 Solve the inequality.
 $7 - 8x \geq 19 + 2x$

$\dots\dots\dots [2]$

- 10 A model of a house is made using a scale of 1 : 30.
The model has a surface area of 6000 cm^2 .

Work out the surface area of the actual house.
Give your answer in square meters.

..... m^2 [3]

- 11 Work out the size of one interior angle of a regular 12-sided polygon.

..... [3]

- 12 Solve the system of linear equations.

$$3x + y = 7$$

$$2x - 3y = 12$$

$x =$

$y =$ [3]

- 13 Work out $3\frac{1}{7} - 1\frac{1}{4}$.
Give your answer as a mixed number in its lowest terms.

..... [3]

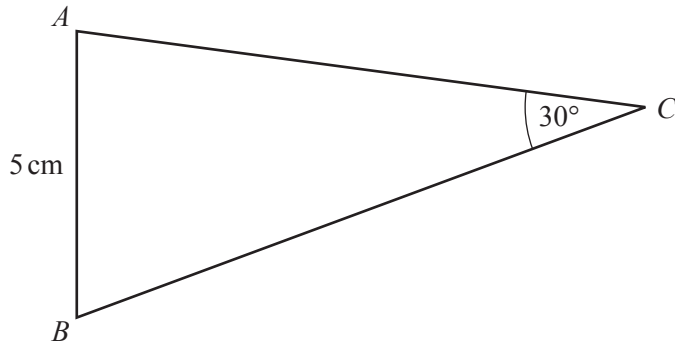
- 14 Solve by factoring.
 $3x^2 - 7x - 20 = 0$

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

- 15 Simplify $(3 + \sqrt{5})^2 + \sqrt{20}$.

..... [3]

16

NOT TO
SCALE

$$\sin A = 0.8.$$

Work out the length of BC .

$$BC = \dots\dots\dots \text{ cm [3]}$$

17 Solve for x .

$$3m + xy = \frac{xp}{4}$$

$$x = \dots\dots\dots [4]$$

- 18 (a) The n th term of a sequence is $6 - 5n$.

Write down the first three terms of this sequence.

.....,, [1]

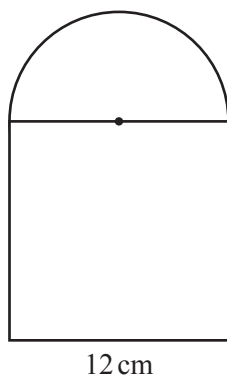
- (b) The n th term of another sequence is $5n^2 + 3$.

Is 608 a term in this sequence?

Explain how you decide.

..... because [3]

19



NOT TO
SCALE

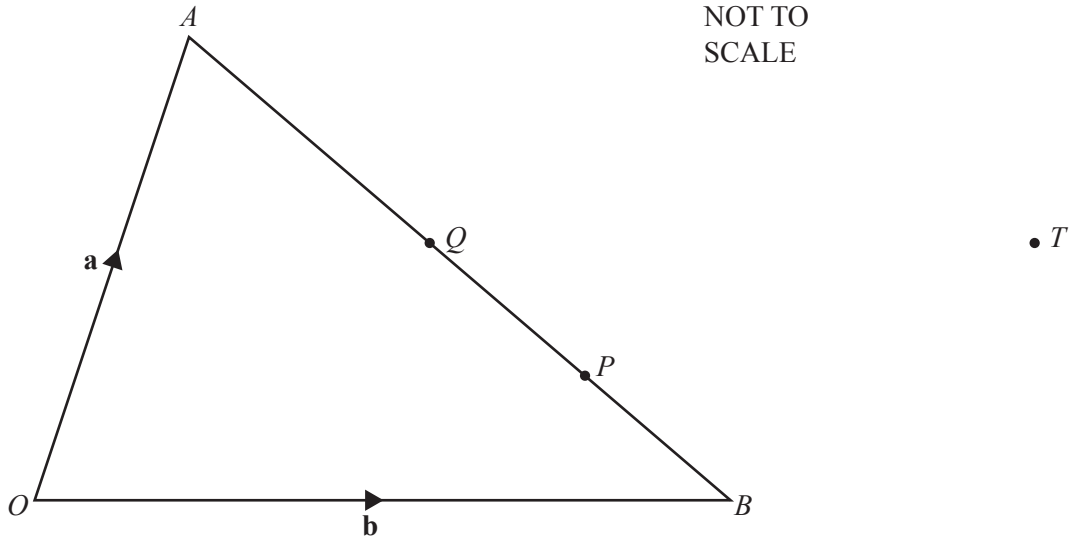
The diagram shows a shape made from a square and a semi-circle.
The total area of the shape is $k\pi + c$ square centimeters.

Find the value of k and the value of c .

$k =$

$c =$ [4]

NOT TO SCALE



In the diagram, $AQ = QB$ and $QP = PB$.
 $\vec{OA} = \mathbf{a}$ and $\vec{OB} = \mathbf{b}$.

(a) Find the following in terms of \mathbf{a} and \mathbf{b} .
 Give your answers in their simplest form.

(i) \vec{AB}

..... [1]

(ii) \vec{QP}

..... [1]

(iii) The position vector of P .

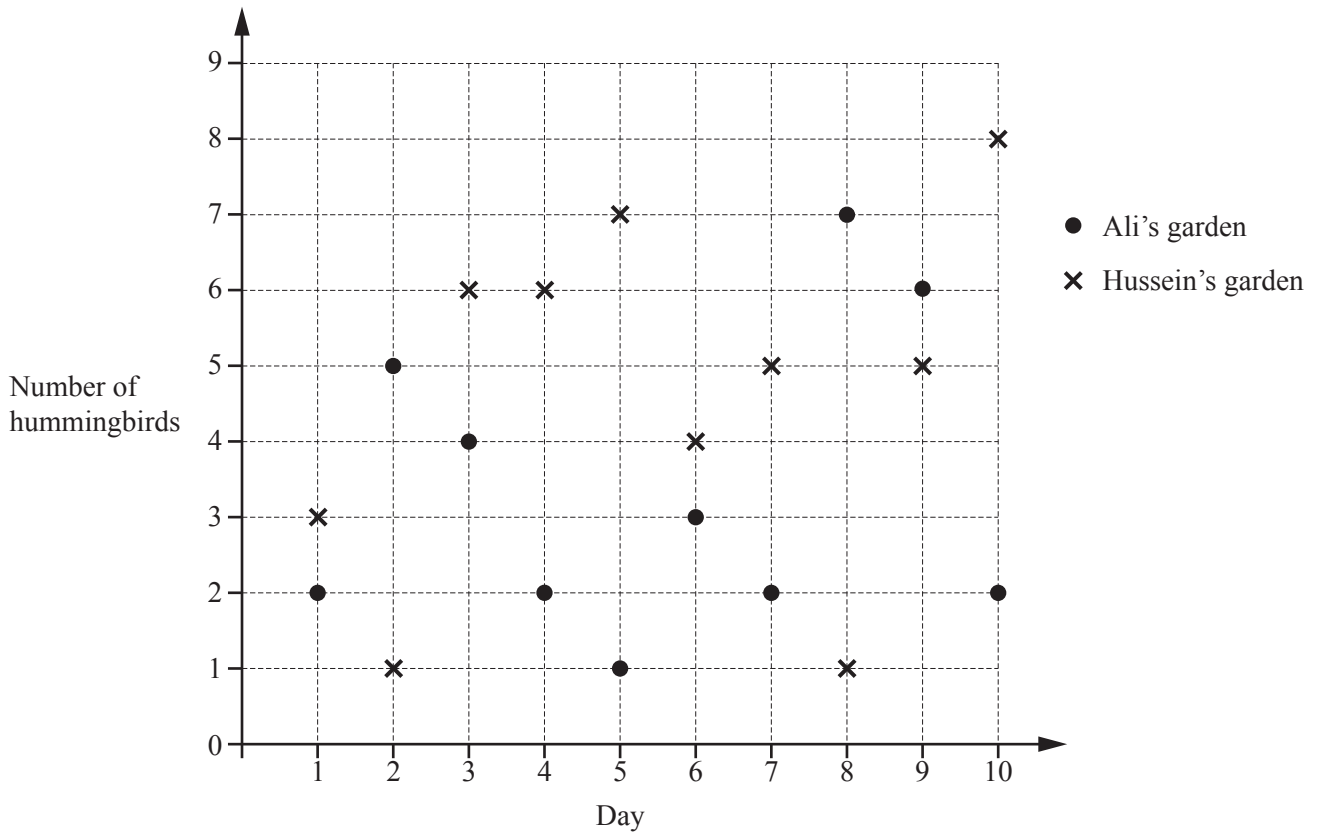
..... [2]

(b) $OBTQ$ is a parallelogram.

Find \vec{AT} in terms of \mathbf{a} and \mathbf{b} .
 Give your answer in its simplest form.

..... [2]

21 The diagram shows the numbers of hummingbirds seen by Ali and Hussein in their gardens each day for 10 days.



(a) Work out the mean number of hummingbirds seen in Ali's garden each day.

..... [3]

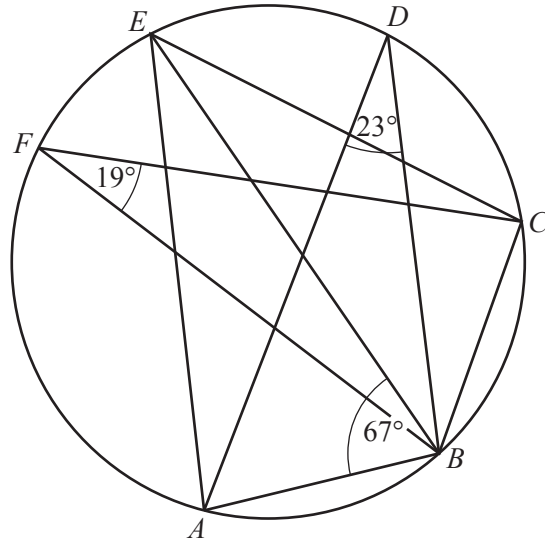
(b) Work out the median number of hummingbirds seen in Hussein's garden each day.

..... [2]

(c) On one of these days there were 4 times as many hummingbirds seen in Hussein's garden as in Ali's garden.

Which day was this?

Day [1]



NOT TO SCALE

In the diagram, points A, B, C, D, E and F lie on the circumference of the circle.
Angle $BFC = 19^\circ$, angle $ADB = 23^\circ$ and angle $ABE = 67^\circ$.

Work out

(a) angle BEC ,

Angle $BEC = \dots\dots\dots [1]$

(b) angle ABC ,

Angle $ABC = \dots\dots\dots [3]$

(c) angle BCE .

Angle $BCE = \dots\dots\dots [2]$

Question 23 is printed on the next page.

23 (a) Write down a cube number that is greater than 100 and less than 1000.

..... [1]

(b) Write down a prime number between 90 and 100.

..... [1]

(c) Write the following in order of size, starting with the smallest.

0.71 7% $\frac{7}{10}$ $\sqrt{49}$

..... < < < [3]
smallest

(d) Find the value of $\left(\frac{27}{8}\right)^{-\frac{2}{3}}$.

..... [2]

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