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MATHEMATICS (US)

0444/21

Paper 2 (Extended)

May/June 2024

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. Any 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 .

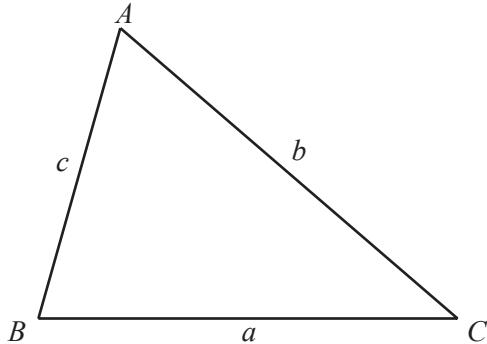
$$V = \frac{1}{3}Ah$$

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

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

Volume, V , of sphere of radius r .

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

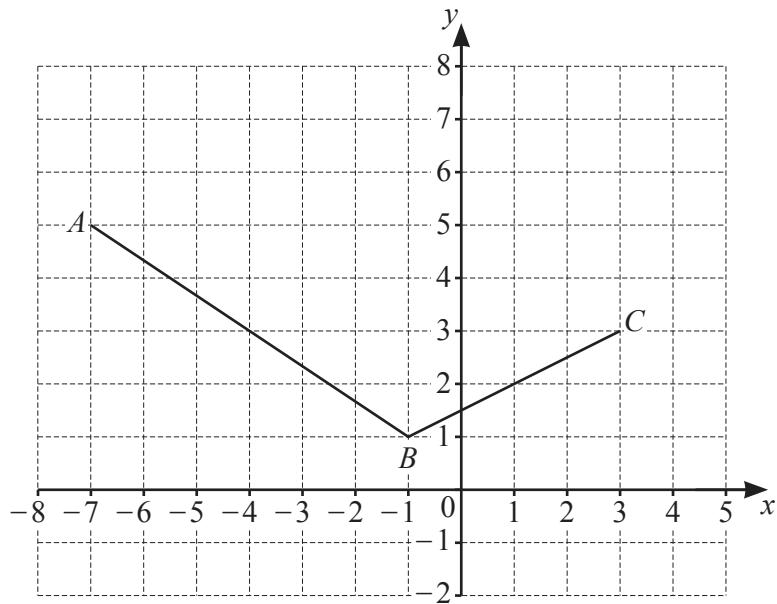


$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

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

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

1



The diagram shows two sides of a parallelogram $ABCD$.

Find the coordinates of point D .

(.....,) [2]

2 Geetha has a box of toys.

She picks a toy at random from the box.

The probability that she picks a wooden toy is 0.6.

(a) Work out the probability that she does not pick a wooden toy.

..... [1]

(b) The box contains three types of toys, wooden, plastic, or metal.

Type of toy	Wooden	Plastic	Metal
Number of toys		14	14
Probability	0.6		

Complete the table.

[2]

3 The table shows some information about two sequences.

	n th term	5th term
Sequence A	$60 - 4n$	
Sequence B	$n^2 - 300$	

(a) Complete the table.

[2]

(b) In sequence B the k th term is -156 .

Find the value of k .

$k = \dots$ [2]

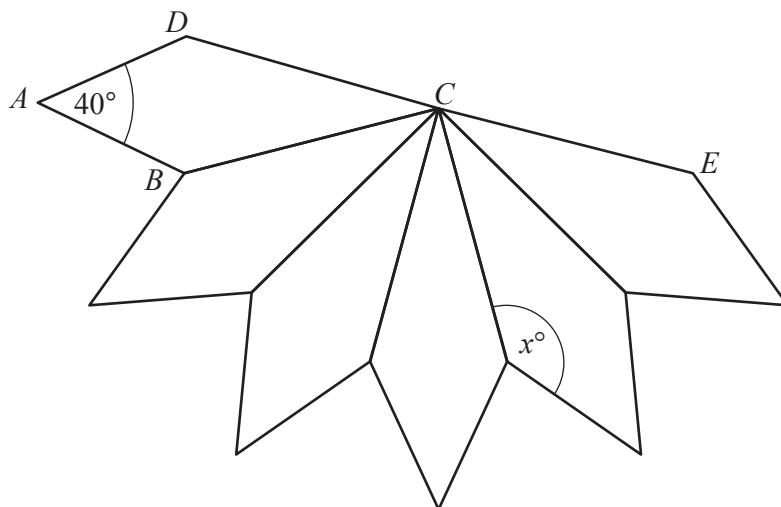
4 Find the greatest **odd** number that is a factor of 140 and a factor of 210.

\dots [2]

5 Work out $(6 \times 10^{17}) \times (2.1 \times 10^{17})$.

Give your answer in scientific notation.

\dots [2]



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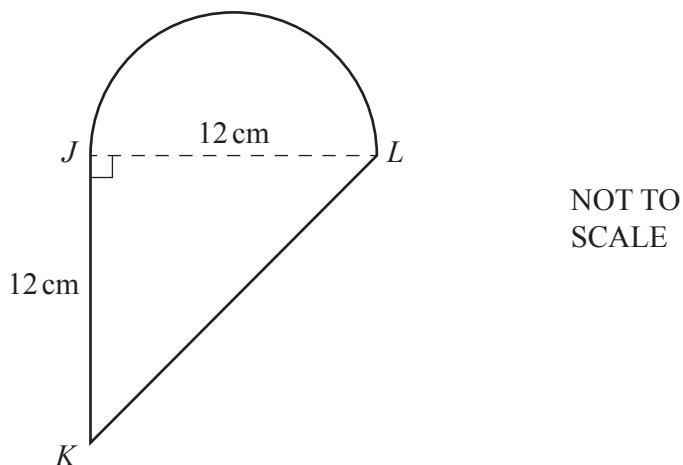
The diagram shows 5 kites that are congruent to kite $ABCD$.

Each kite is joined to the next kite along one edge.

Angle $DAB = 40^\circ$ and DCE is a straight line.

Find the value of x .

$x = \dots$ [3]



The diagram shows a shape made from a triangle JKL and a semicircle with diameter JL . JKL is an isosceles right-angled triangle with $JK = JL = 12 \text{ cm}$.

(a) Work out the area of this shape.
Give your answer in the form $a + b\pi$.

..... cm^2 [3]

(b) Work out the perimeter of this shape.

Give your answer in the form $a + b\sqrt{2} + c\pi$.

..... cm [4]

8 These are the first five terms of a sequence.

11

18

25

32

39

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

..... [2]

9 The value of a car is \$10 000.

Each year the value of the car decreases exponentially by 20%.

Work out the value of this car after 2 years.

\$ [2]

10 Amir invests \$3000 in an account.

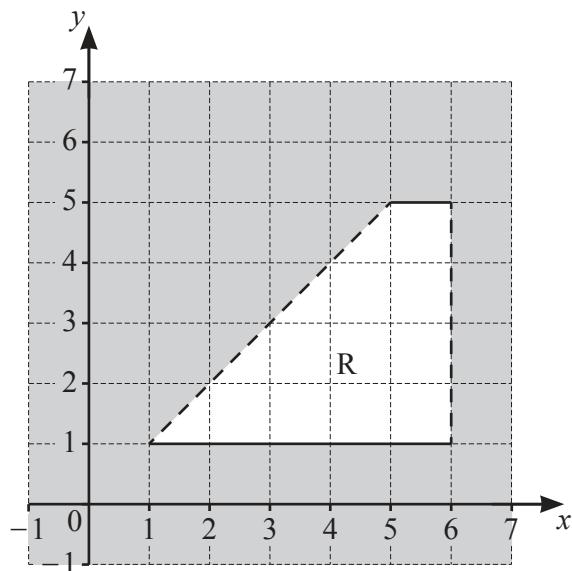
The account pays simple interest at a rate of r % per year.

At the end of 6 years the value of his investment is \$3360.

Find the value of r .

$r =$ [3]

11



Find the inequalities that define the unshaded region, R.

..... [4]

12 Solve the system of linear equations.
You must show all your working.

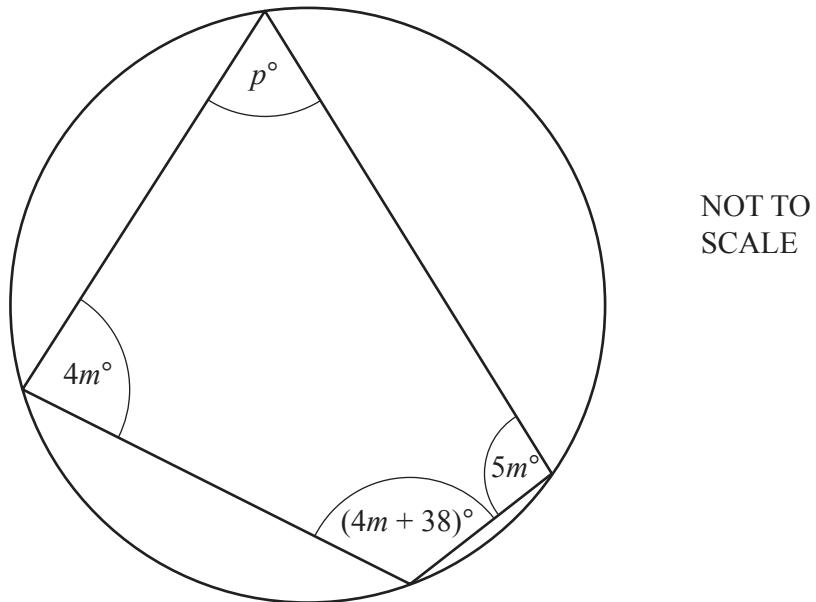
$$6x + 2y = 29$$

$$3x - 4y = 17$$

$$x = \dots$$

$$y = \dots [3]$$

13

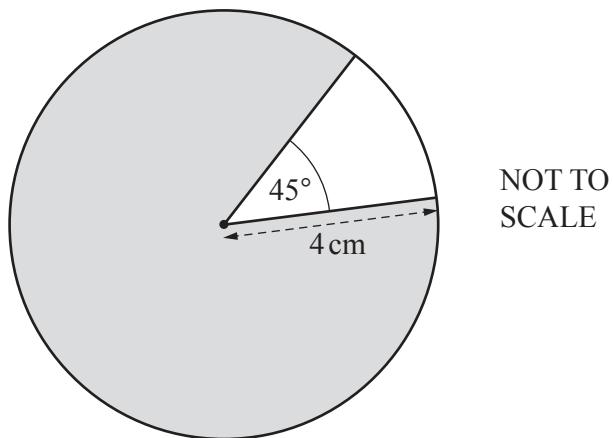


The diagram shows a cyclic quadrilateral.

Find the value of p .

$$p = \dots \quad [3]$$

14



The area of the shaded sector is $k\pi\text{ cm}^2$.

Find the value of k .

$$k = \dots \quad [3]$$

15 (a) Simplify $\sqrt{20} \times \sqrt{5}$.

$$\dots \quad [1]$$

(b) $(3 + 2\sqrt{3})^2 = c + k\sqrt{3}$

Find the value of c and the value of k .

$$c = \dots$$

$$k = \dots \quad [2]$$

16 Simplify.

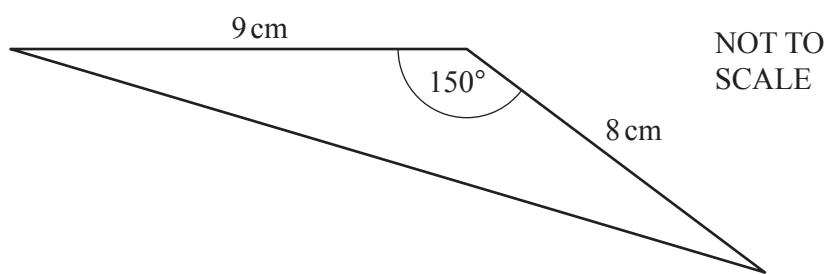
(a) 177^0

..... [1]

(b) $\left(\frac{1}{2}\right)^{-2}$

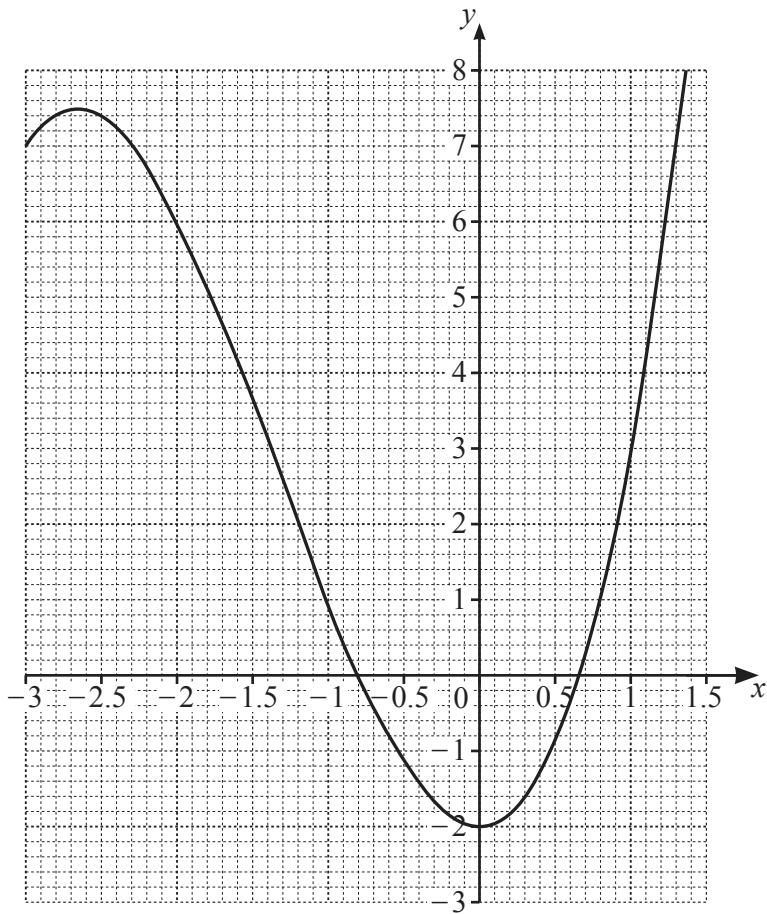
..... [1]

17



Work out the area of the triangle.

..... cm^2 [3]



The diagram shows the graph of $y = x^3 + 4x^2 - 2$ for $-3 \leq x \leq 1.5$.

By drawing a suitable straight line, solve the equation $x^3 + 4x^2 - 2 = 2x$ for $-3 \leq x \leq 1.5$.

$$x = \dots \text{ or } x = \dots \quad [3]$$

19 Factor completely.

(a) $12m^2 - 75t^2$

..... [3]

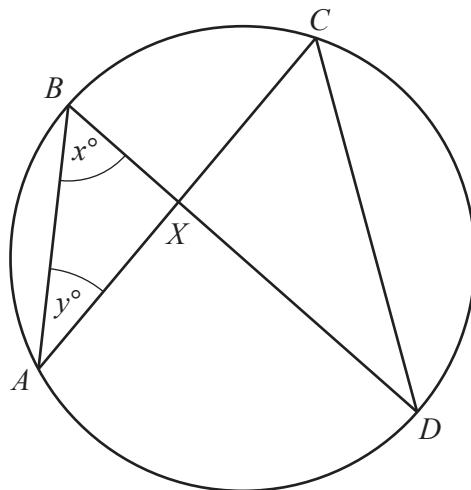
(b) $xy + 15 + 3y + 5x$

..... [2]

20 Solve the equation $4 \cos x + 5 = 3$ for $0^\circ \leq x \leq 360^\circ$.

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

21

NOT TO
SCALE

The points A , B , C and D lie on a circle.
The chords AC and BD intersect at X .

(a) Find, in terms of x and/or y

(i) angle AXB

..... [1]

(ii) angle CDX .

..... [1]

(b) $AB = 4$ cm, $AX = 3$ cm, $BX = 1.8$ cm and $CD = 6$ cm.

Work out the length of CX .

$CX =$ cm [2]

22 Bag A and bag B each contain red counters and blue counters only. Stephan picks a counter at random from bag A and Jen picks a counter at random from bag B .

The probability that Stephan picks a red counter is $\frac{2}{5}$.

The probability that Stephan and Jen both pick a red counter is $\frac{1}{4}$.

Find the probability that Stephan and Jen both pick a blue counter.

..... [4]

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