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0607/23

May/June 2015

45 minutes

Additional Materials: Geometrical Instruments

READ THESE INSTRUCTIONS FIRST

DO **NOT** WRITE IN ANY BARCODES.

CALCULATORS MUST NOT BE USED IN THIS PAPER.

The total number of marks for this paper is 40.

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

Formula List

For the equation $ax^2 + bx + c = 0$ $x = \frac{-b \pm \sqrt{b^2 - 4ac}}{2a}$

Curved surface area, A , of cylinder of radius r , height h . $A = 2\pi rh$

Curved surface area, A , of cone of radius r , sloping edge l . $A = \pi rl$

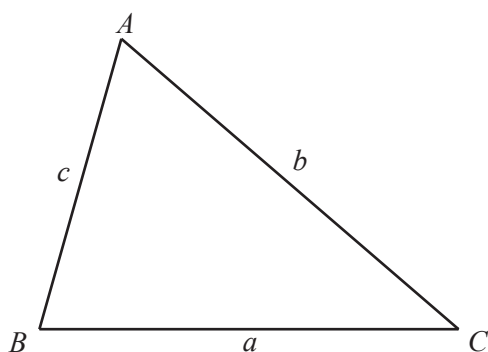
Curved surface area, A , of sphere of radius r . $A = 4\pi r^2$

Volume, V , of pyramid, base area A , height h . $V = \frac{1}{3}Ah$

Volume, V , of cylinder of radius r , height h . $V = \pi r^2 h$

Volume, V , of cone of radius r , height h . $V = \frac{1}{3}\pi r^2 h$

Volume, V , of sphere of radius r . $V = \frac{4}{3}\pi r^3$



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

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

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

Answer **all** the questions.

- 1** Round these numbers to 3 significant figures.

(a) 0.000 604 83

Answer(a) [1]

(b) 6 998 800

Answer(b) [1]

- 2** By rounding each number to 1 significant figure, estimate the value of

$$\frac{0.583 \times 311.6}{1.82 + 10.43}.$$

Show your working.

Answer [2]

3 $a = 2^3 \times 3 \times 5^2$ $b = 2^2 \times 3^2 \times 7^6$

(a) Find, giving each answer as the product of prime factors,

(i) the highest common factor (HCF) of a and b ,

Answer(a)(i) [1]

(ii) $\sqrt{b}$.

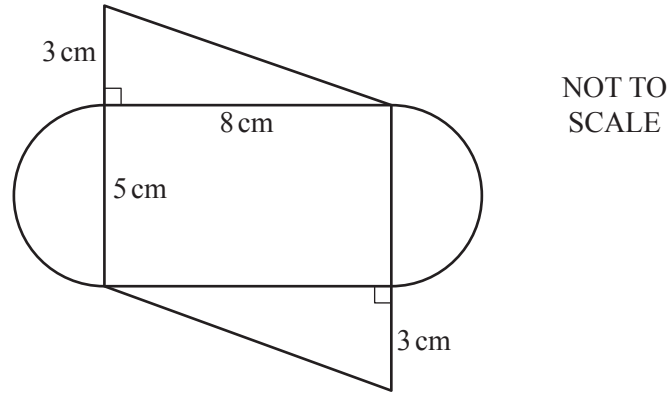
Answer(a)(ii) [1]

(b) ap is a cube number.

Find the smallest integer value of p .

Answer(b) [1]

4



The diagram shows a rectangle, two semicircles and two right-angled triangles.

- (a) Find the total area of the shape.
Give your answer in the form $a + b\pi$.

Answer(a)cm² [3]

- (b) Describe fully the symmetry of the shape.

Answer(b)
..... [2]

5 Solve.

$$5(x + 2) < 2(4x - 7)$$

Answer [3]

- 6 François and George each ask a sample of students at their college how they travel to college.

These are their results.

	Walk	Cycle	Bus	Train	Car	Total number of students
François	7	3	4	1	5	20
George	46	24	44	11	25	150

- (a) Explain why George's results will give the better estimates of the probabilities of the different types of travel.

Answer(a) [1]

- (b) A student is selected at random.

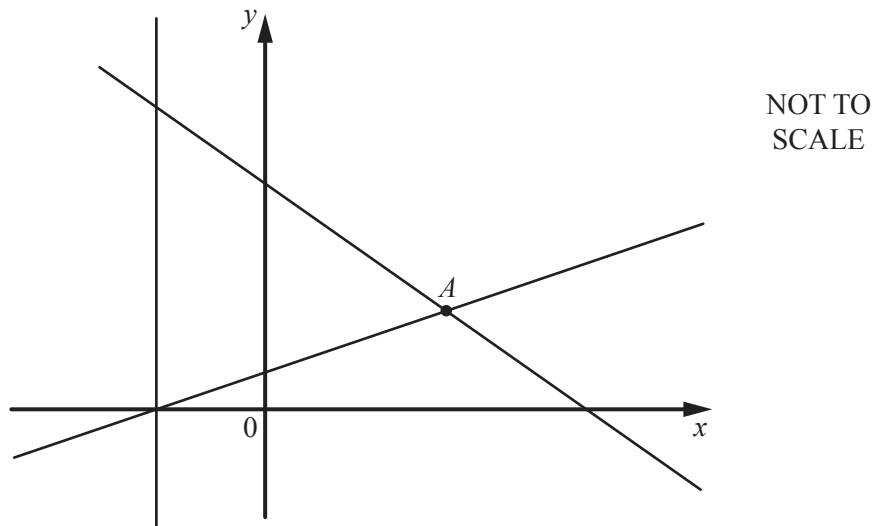
- (i) Use George's results to estimate the probability that the student cycles to college.

Answer(b)(i) [1]

- (ii) There are 3000 students at the college.

Use George's results to estimate the number of students who cycle to college.

Answer(b)(ii) [1]



The diagram shows the lines $x = -2$, $y = \frac{1}{2}x + 1$ and $3x + 4y = 20$.

- (a) Use simultaneous equations to find the co-ordinates of the point A .

Answer(a) (..... ,) [3]

- (b) (i) P is a point in the region such that

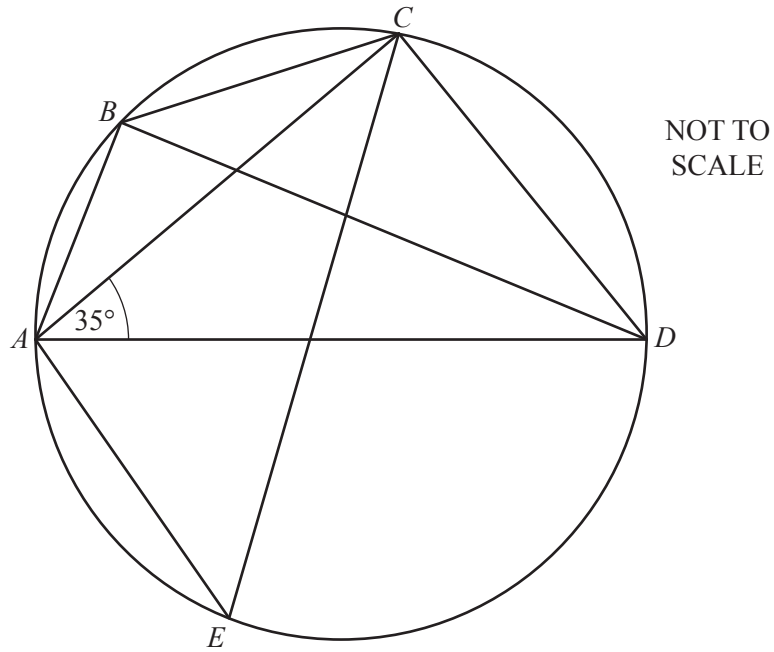
$$x < -2, \quad y > \frac{1}{2}x + 1 \quad \text{and} \quad 3x + 4y < 20.$$

On the diagram, mark and label a possible position of P . [1]

- (ii) Q is a point in the region such that

$$x > -2, \quad y = \frac{1}{2}x + 1 \quad \text{and} \quad 3x + 4y < 20.$$

On the diagram, mark and label a possible position of Q . [1]



In the diagram, A , B , C , D and E are points on the circle.
 AD is a diameter and angle $CAD = 35^\circ$.

Find

(a) angle ACD ,

Answer(a) [1]

(b) angle CBD ,

Answer(b) [1]

(c) angle AEC .

Answer(c) [2]

9 The sets P , Q and R are subsets of the universal set U .

- $P \cap R \neq \emptyset$
- Q is a subset of R
- $Q \cap P = \emptyset$

Complete the Venn diagram to show the sets P , Q , and R .



[3]

10 (a) Factorise $x^2 - 3x - 10$.

Answer(a) [2]

(b) Make x the subject of $y = \frac{\sqrt[3]{x}}{a}$.

Answer(b) $x =$ [2]

11 (a) Find $\log_5 \frac{1}{25}$.

Answer(a) [1]

(b) Find x when

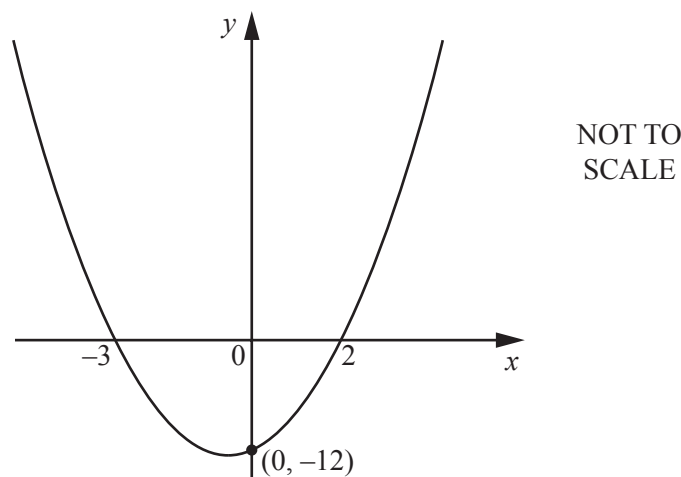
(i) $\log x - \log 2 = \log 6$,

Answer(b)(i) [1]

(ii) $\log_x 4 = \frac{1}{2}$.

Answer(b)(ii) [1]

Question 12 is printed on the next page.



The diagram shows a sketch of the graph of $y = ax^2 + bx + c$.
The graph goes through the points $(-3, 0)$, $(0, -12)$ and $(2, 0)$.

Find the values a , b and c .

Answer

$a =$

$b =$

$c =$ [3]

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