Cambridge IGCSE

CANDIDATE NAME

CENTER NUMBER

CANDIDATE NUMBER

MATHEMATICS (US)

0444/21

Paper 2 (Extended)

May/June 2019

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.

Cambridge Assessment
International Education

[Turn over

Formula List

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

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

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

Surface area, A, of sphere of radius r. $\qquad A = 4\pi r^2$

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

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

Volume, V, of sphere of radius r. $\qquad V = \frac{4}{3}\pi r^3$
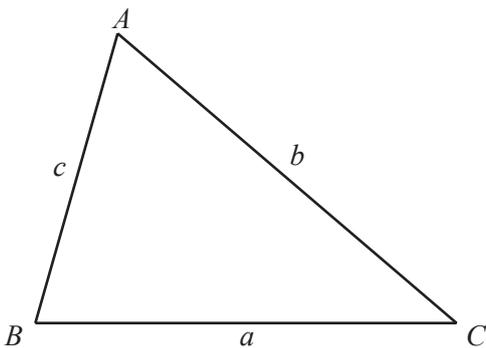
$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

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

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

1 Work out $12 as a percentage of $16.

....% [1]

2 Factor $5y - 6py$.

.... [1]

3 Work out $\sqrt[3]{9^2 - 6 \times 3^2}$.

.... [2]

4 The volume of a cuboid is $180 \, \text{cm}^3$.
The base is a square of side length $3 \, \text{cm}$.

Calculate the height of this cuboid.

.... cm [2]

5 Simplify.

(a) $t^{21} \div t^7$

.... [1]

(b) $(u^5)^5$

.... [1]

6
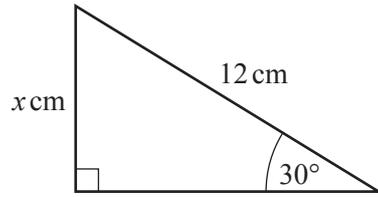
NOT TO SCALE

The diagram shows a right-angled triangle.

Calculate the value of x.

$x =$ .... [2]

7
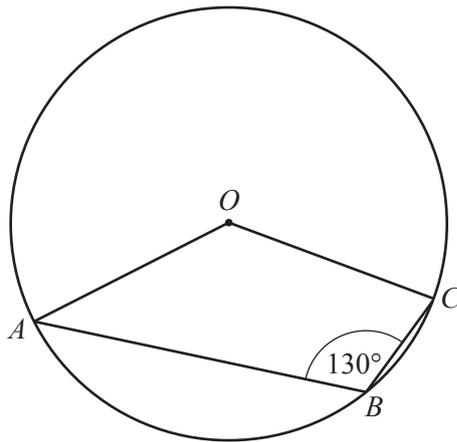
NOT TO SCALE

A, B and C are points on the circle, center O.

Find the obtuse angle AOC.

Angle $AOC =$ .... [2]

8 Simplify $(\sqrt{3} + \sqrt{2})^2$.

.... [2]

9 $\qquad$ f$(x) = 2x + 3$

Find f$(1 - x)$ in its simplest form.

.... [2]

10

| 1 | 2 | 3 | 4 | 5 |

The diagram shows five cards.
Two of the cards are taken at random, without replacement.

Find the probability that both cards show an even number.

.... [2]

11   27   28   29   30   31   32   33

From the list of numbers, write down

(a) a multiple of 7,

.... [1]

(b) a cube number,

.... [1]

(c) a prime number.

.... [1]

12 $x^2 + 4x - 9 = (x + a)^2 + b$

Find the value of a and the value of b.

$a = $ ....

$b = $ .... [3]

13 Work out $\dfrac{5}{6} + \dfrac{2}{3}$.

Give your answer as a mixed number in its simplest form.

.... [3]

14 Expand and simplify.
$$(x + 1)(x + 2) + 2x(x - 3)$$

.... [3]

15 *y* varies inversely as the square root of $(x + 1)$.
When $x = 8$, $y = 2$.

Find *y* when $x = 99$.

$y =$ .... [3]

16 (a) Factor $p^2 - q^2$.

.... [1]

(b) $p^2 - q^2 = 7$ and $p - q = 2$.

Find the value of $p + q$.

.... [2]

17 (a) Simplify $\left(81y^{16}\right)^{\frac{3}{4}}$.

.... [2]

(b) $2^3 = 4^p$

Find the value of *p*.

$p =$ .... [1]

18 A model of a car has a scale 1 : 20.
The volume of the actual car is $8\,\text{m}^3$.

Find the volume of the model.
Give your answer in cubic centimeters.

....cm^3 [3]

19 Write as a single fraction in its simplest form.

$$\frac{1}{x+2} - \frac{2}{3x-1}$$

.... [3]

20 (a) $\text{f}(x) = 4\sin(3x)°$

Write down the amplitude and period of $\text{f}(x)$.

Amplitude = ...

Period = ... [2]

(b) Write down the exact value of $\cos 210°$.

.... [1]

(c) Angle $y°$ is acute and $\sin y° = k$.

Find $\cos(90+y)°$ in terms of k.

.... [1]

21 (a) These are the first four terms of a sequence.

$$5 \qquad 8 \qquad 11 \qquad 14$$

(i) Write down the next term.

.... [1]

(ii) Find an expression, in terms of *n*, for the *n*th term.

.... [2]

(b) These are the first five terms of another sequence.

$$\frac{1}{2} \qquad \frac{3}{4} \qquad \frac{7}{6} \qquad \frac{13}{8} \qquad \frac{21}{10}$$

Find the next term.

.... [1]

22
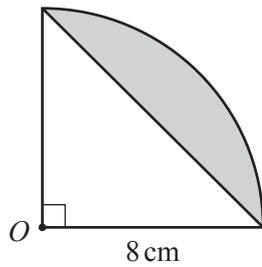
NOT TO
SCALE

The diagram shows a sector of a circle, center O, with radius 8 cm and sector angle 90°.
The area of the shaded segment $= p\pi + q$.

Find the value of p and the value of q.

$p =$ ....

$q =$ .... [4]

23 (a) Jonny makes n chairs in one week.
He makes at least 2 chairs and no more than 5 chairs.
He sells the n chairs at a price of C(n) dollars.

$$C(n) = 20 + 70n$$

Find the domain and range of C(n).

Domain = { .... }

Range = { .... } [2]

(b) $f(x) = x^2$ $\qquad\qquad$ $g(x) = (x-1)^2$

Describe fully the **single** transformation that maps the graph of $y = f(x)$ onto the graph of $y = g(x)$.

....

.... [2]

24
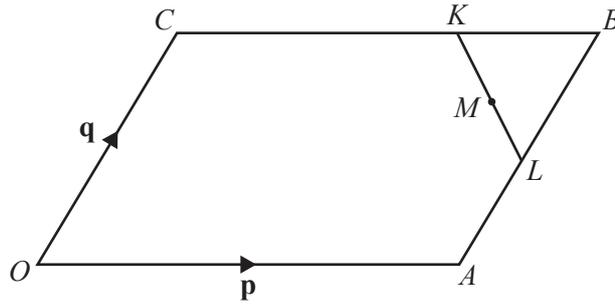
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OABC is a parallelogram and *O* is the origin.
CK = 2*KB* and *AL* = *LB*.
M is the midpoint of *KL*.
$\overrightarrow{OA}$ = **p** and $\overrightarrow{OC}$ = **q**.

Find, in terms of **p** and **q**, giving your answer in its simplest form

(a) $\overrightarrow{KL}$,

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

(b) the position vector of *M*.

.... [2]

Question 25 is printed on the next page.

25 Line L passes through the points $(0, -3)$ and $(6, 9)$.

(a) Find the equation of line L.

.... [3]

(b) Find the equation of the line that is perpendicular to line L and passes through the point $(0, 2)$.

.... [2]