Cambridge
IGCSE

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MATHEMATICS (US) 0444/21

Paper 2 (Extended) May/June 2015

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
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[Turn over

Formula List

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

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. $A = 4\pi r^2$

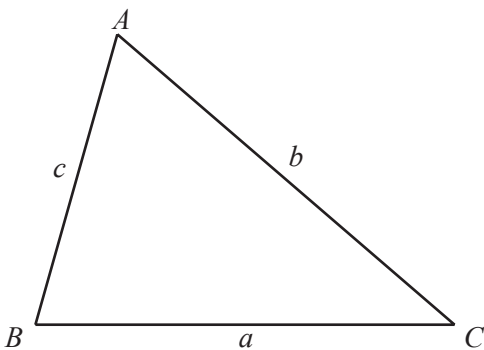Volume, V, of pyramid, base area A, height h. $V = \frac{1}{3}Ah$

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

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

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

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

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

1 At noon the temperature was $4\,°C$.
At midnight the temperature was $-5.5\,°C$.

Work out the difference in temperature between noon and midnight.

Answer .... °C [1]

2 Work out 0.01^2.

Answer .... [1]

3 Expand and simplify.
$$x(2x+3)+5(x-7)$$

Answer .... [2]

4 Paul and Sammy take part in a race.

The probability that Paul wins the race is $\frac{7}{25}$.

The probability that Sammy wins the race is 26%.

Who is more likely to win the race?
Give a reason for your answer.

Answer .... because .... [2]

5 Simplify.
$$6uw^{-3} \times 4uw^6$$

Answer .... [2]

6 Simplify.
$$\sqrt{12} + \sqrt{27}$$

Answer .... [2]

7   The point *A* has co-ordinates $(-1, 5)$ and the point *B* has co-ordinates $(7, 11)$.

Work out the length of the line *AB*.

Answer AB = ... units [3]

8   Work out $\frac{3}{7} \div 1\frac{4}{5}$.

Give your answer as a fraction in its lowest terms.

Answer .... [3]

9   Work out the value of

(a) $8^{\frac{1}{3}}$,

Answer (a) .... [1]

(b) $\left(\frac{1}{4}\right)^{-\frac{3}{2}}$.

Answer (b) .... [2]

10 Find the nth term of each sequence.

(a) 4, 8, 12, 16, 20, ...

Answer (a) .... [1]

(b) 11, 20, 35, 56, 83, ...

Answer (b) .... [2]

11 p varies inversely as the square of $(q + 4)$.
$p = 2$ when $q = 2$.
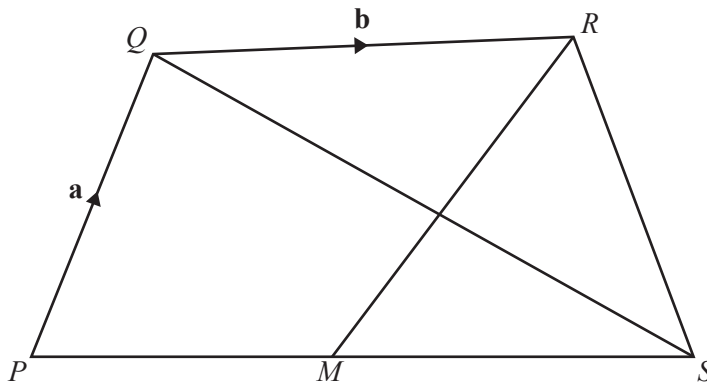
Find the value of p when $q = -2$.

Answer p = ... [3]

12 (a) Change 18 km/h into m/s.

Answer (a) .... m/s [2]

(b) Work out the time it takes a cyclist to travel 270 **meters** at 18 km/h.
Give your answer in seconds.

Answer (b) .... s [1]

13

PQRS is a quadrilateral and *M* is the midpoint of *PS*.
$\overrightarrow{PQ} = \mathbf{a}$, $\overrightarrow{QR} = \mathbf{b}$ and $\overrightarrow{QS} = 2\mathbf{b} - \mathbf{a}$.

(a) Find $\overrightarrow{PS}$ in terms of **a** and/or **b**.

Answer (a) .... [1]

(b) Write down the mathematical name for the quadrilateral *PQRM*, giving reasons for your answer.

Answer (b) .... because ....

.... [2]

14
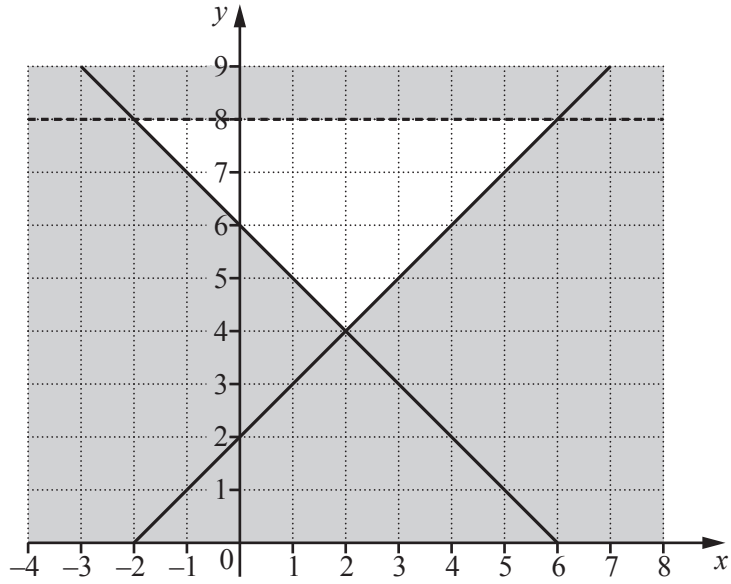
Write down the 3 inequalities which define the unshaded region.

Answer ....

....

.... [4]

15 Georg invests \$5000 at a rate of 2% per year simple interest.

Work out the total value of his investment after 3 years.

Answer \$ .... [3]

16 (a) Write 30 as a product of its prime factors.

Answer (a) .... [2]

(b) Find the least common multiple (LCM) of 30 and 45.

Answer (b) .... [2]

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

$$5x + 2y = 13$$
$$3x - 5y = 14$$

Answer x = ...

y = ... [4]

18
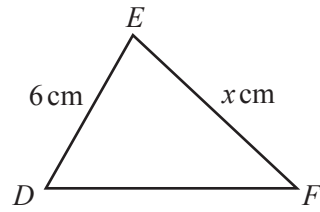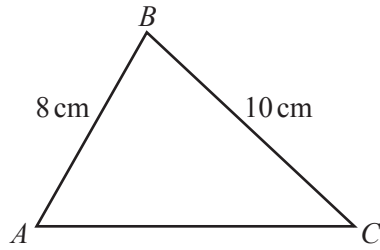
Triangle *ABC* is similar to triangle *DEF*.

(a) Work out the value of *x*.

Answer (a) x = ... [2]

(b) The area of triangle *ABC* is 32 cm².

Work out the area of triangle *DEF*.

Answer (b) .... cm² [2]

19 Factor completely.

(a) $yp + yt + 2xp + 2xt$

Answer (a) .... [2]

(b) $7(h + k)^2 - 21(h + k)$

Answer (b) .... [2]

20

NOT TO SCALE

9 cm

3 cm
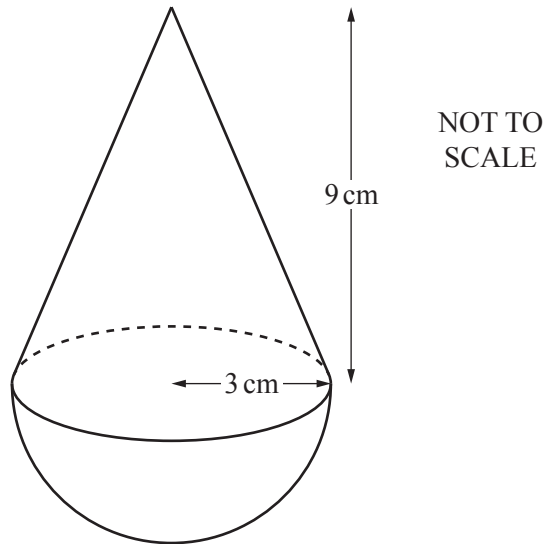
The diagram shows a toy.
The shape of the toy is a cone, with radius 3 cm and height 9 cm, on top of a hemisphere with radius 3 cm.

Find the volume of the toy in terms of π.

Answer .... cm³ [3]

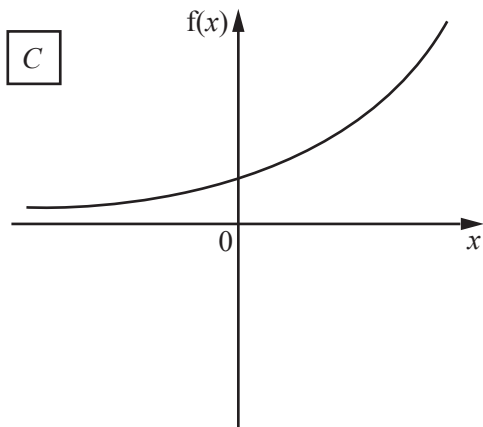**21** **(a)** Write $2 \times 10^{12} + 3 \times 10^{11}$ in scientific notation.

Answer (a) .... [2]

(b) $a \times 10^2 + b \times 10^4 = k \times 10^2$

Find k in terms of a and b.

Answer (b) $k =$ .... [1]

22
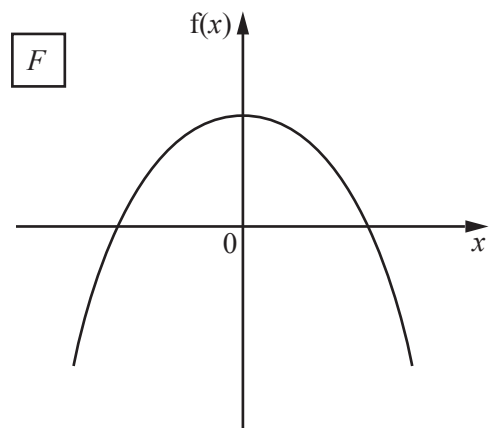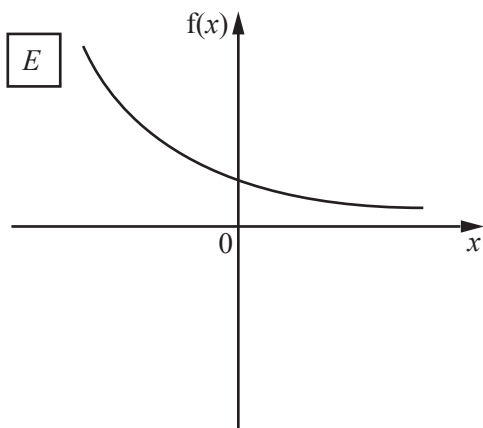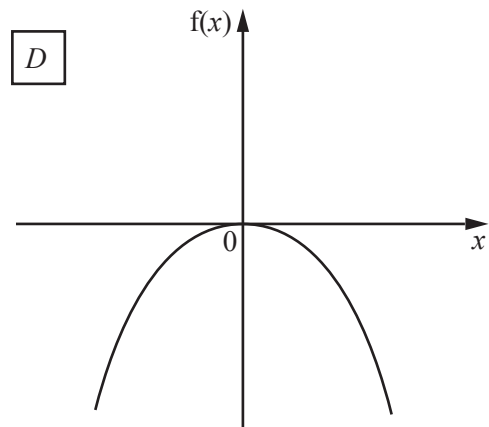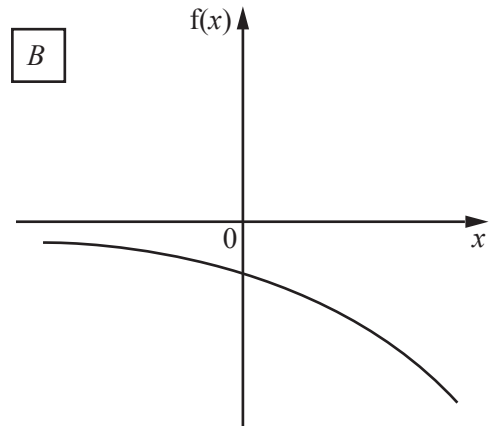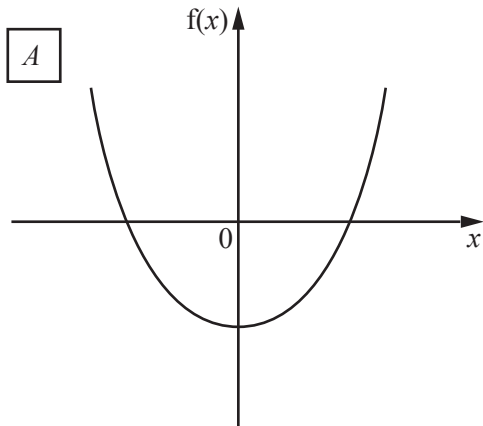
Choose the correct graph for these four functions.
Write the matching letter in the spaces provided.

f(x) = 4 − x^2 ....

f(x) = 1.1^x ....

f(x) = x^2 − 4 ....

f(x) = 0.7^x .... [4]

Question 23 is printed on the next page.

23 $f(x) = 5 - 3x$

(a) Find $f(6)$.

Answer (a) .... [1]

(b) Find $f(x + 2)$.

Answer (b) .... [1]

(c) Find $f(f(x))$, in its simplest form.

Answer (c) .... [2]

(d) Find $f^{-1}(x)$, the inverse of $f(x)$.

Answer (d) $f^{-1}(x) =$ .... [2]