

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 .

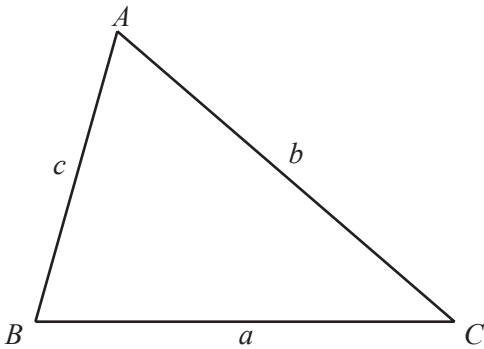
$$V = \frac{1}{3}Ah$$

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 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 $^{\circ}\text{C}$ [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 $AB = \dots\dots\dots$ units [3]

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

Give your answer as a fraction in its lowest terms.

Answer $\dots\dots\dots$ [3]

- 9 Work out the value of

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

Answer (a) $\dots\dots\dots$ [1]

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

Answer (b) $\dots\dots\dots$ [2]

10 Find the n th 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]

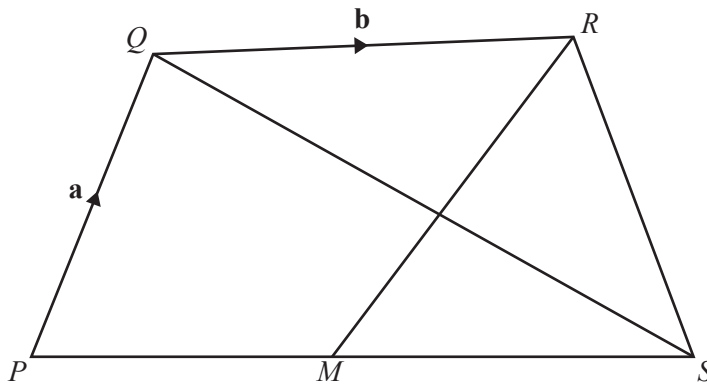
- 12 (a) Change 18 km/h into m/s.

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]

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NOT TO
SCALE

$PQRS$ is a quadrilateral and M is the midpoint of PS .

$\vec{PQ} = \mathbf{a}$, $\vec{QR} = \mathbf{b}$ and $\vec{QS} = 2\mathbf{b} - \mathbf{a}$.

- (a) Find \vec{PS} in terms of \mathbf{a} and/or \mathbf{b} .

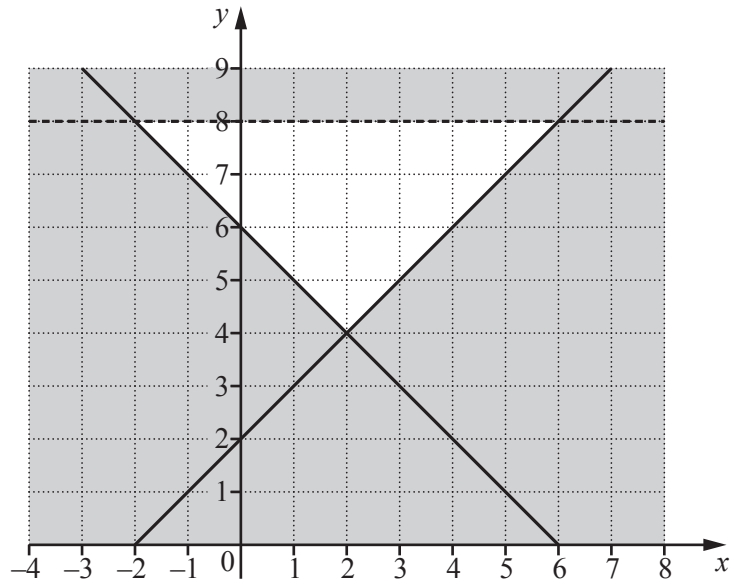
Answer (a) [1]

- (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.

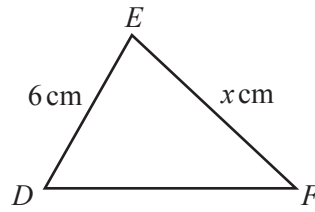
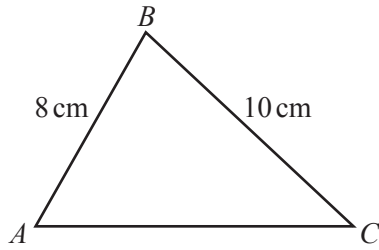
$$5x + 2y = 13$$

$$3x - 5y = 14$$

Answer $x =$

$y =$ [4]

18



NOT TO SCALE

Triangle ABC is similar to triangle DEF .

(a) Work out the value of x .

Answer (a) $x = \dots\dots\dots$ [2]

(b) The area of triangle ABC is 32 cm^2 .

Work out the area of triangle DEF .

Answer (b) $\dots\dots\dots\text{ cm}^2$ [2]

19 Factor completely.

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

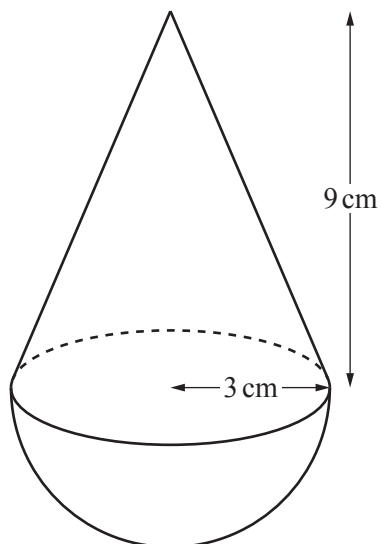
Answer (a) $\dots\dots\dots$ [2]

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

Answer (b) $\dots\dots\dots$ [2]

20

10



NOT TO SCALE

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.

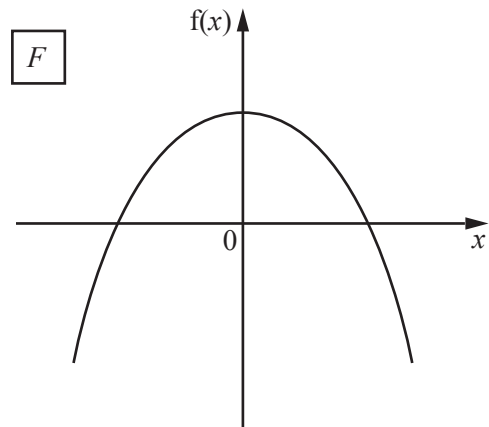
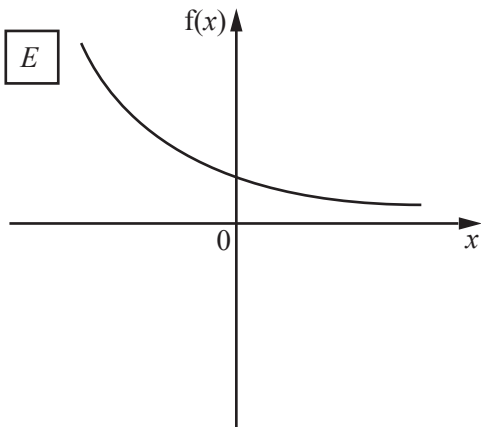
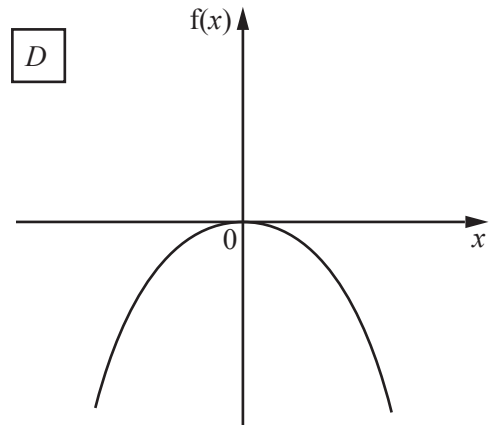
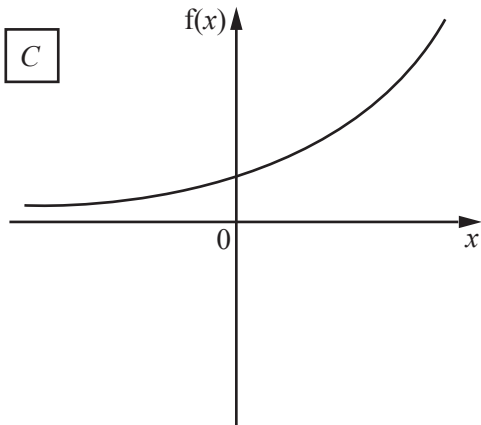
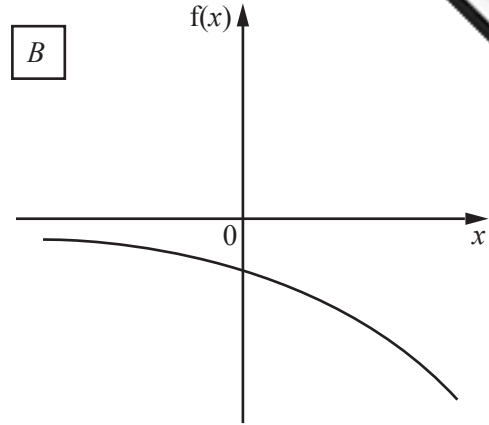
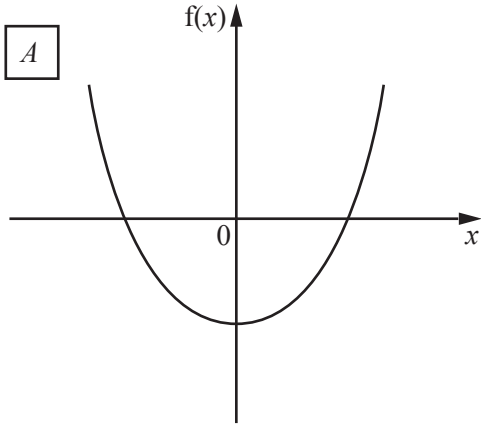
Answer (a) [2]

(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]

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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]

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