

A6... Substitution into expressions

OCR

7 (a) Use the formula $V = p^3$ to find V when $p = 2$.

(a) [1]

7 (a) Use the formula $V = p^3$ to find V when $p = 2$.

$$V = 2^3$$

$$2^3 = 2 \times 2 \times 2$$

(a) 8 [1]

1 (a) Using $a = 5$ work out.

(i) $a + 6$

(a)(i) [1]

(ii) $4a$

(ii) [1]

(iii) $3a^2 - 1$

(iii) [2]

1 (a) Using $a = 5$ work out.

(i) $a + 6$

$$5 + 6$$

(a)(i) 11 [1]

(ii) $4a$

$$4 \times 5$$

(ii) 20 [1]

(iii) $3a^2 - 1$

$$5^2 = 25$$

$$25 \times 3 = 75$$

(iii) 74 [2]

STATION

19 (a) Use the formula $s = ut + \frac{1}{2}at^2$ to find s when $u = 2$, $a = 10$ and $t = 5$.

(a) [2]

(b) Expand and simplify.

$$(x + 7)(x - 3)$$

(b) [2]

- 19 (a) Use the formula $s = ut + \frac{1}{2}at^2$ to find s when $u = 2$, $a = 10$ and $t = 5$.

$$ut = 2 \times 5 = 10$$

$$\frac{1}{2}at^2 =$$

$$t^2 = 5^2 = 25$$

$$25 \times 10 = 250 \\ = 125$$

(a) $10 + 125 = 135$ [2]

- (b) Expand and simplify.

$$(x+7)(x-3)$$

x	x	$+7$
x	x^2	$+7x$
-3	$-3x$	-21

(b) $x^2 + 4x - 21$ [2]

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5 (a) Find the value of $3a + 2b$ when $a = 16$ and $b = 7$.

(a) [2]

- 5 (a) Find the value of $3a + 2b$ when $a = 16$ and $b = 7$.

$$3a = 3 \times 16 = 48$$

$$2b = 2 \times 7 = 14$$

(a) 62 [2]

(b) Find the value of $10h + 6t$ when $h = 12$ and $t = 4$.

(b) [2]

(c) Rearrange this formula to make d the subject.

$$e = f - 7d$$

(c) [2]

- (b) Find the value of $10h + 6t$ when $h = 12$ and $t = 4$.

$$10h = 120$$

$$6t = 24$$

(b) 144 [2]

- (c) Rearrange this formula to make d the subject.

$$e = f - 7d$$

on its own

$$e = -7d + f$$

$d \rightarrow (x-7) \rightarrow (-f) \rightarrow e$

\leftarrow

$$d = \frac{e-f}{-7} \quad \checkmark$$

$$e = f - 7d$$

$$e - f = -7d$$

$$\frac{e-f}{-7} = d \quad \checkmark$$

(c) [2]

- 6** A leopard is running with a velocity of 3 m/s. It then accelerates at 2 m/s² for 4 seconds.

Use the formula

$$v = u + at$$

to work out the final velocity of the leopard.

..... m/s **[2]**

- 6 A leopard is running with a velocity of 3 m/s.
A6 It then accelerates at 2 m/s^2 for 4 seconds.

Use the formula

$$v = u + at$$

to work out the final velocity of the leopard.

V = final velocity

u = velocity

a = acceleration

t = time

$$V = 3 + (2 \times 4)$$

$$V = 3 + 8$$

$$V = 11$$

..... 11 m/s [2]

6 You are given that $5y = 4x$.

(a) Find the value of y when $x = 10$.

A6

(a) $y = \dots\dots\dots$ [2]

(b) Write y in terms of x .

A9

(b) $y = \dots\dots\dots$ [1]

6 You are given that $5y = 4x$.

(a) Find the value of y when $x = 10$.

A6

$$5y = 40$$

$$y = \frac{40}{5} = 8$$

(a) $y = \dots\dots\dots 8$ [2]

(b) Write y in terms of x .

A9

$$y =$$

$$5y = 4x$$

$$y = \frac{4x}{5}$$

(b) $y = \dots\dots\dots \frac{4x}{5}$ [1]

12 Use the formula

A6 $v = u + at$

to find the final velocity, when

- the initial velocity is 8 m/s
- the acceleration is 3 m/s²
- the time is 5 seconds.

..... m/s **[2]**

12 Use the formula

A6

$$v = u + at$$

to find the final velocity, when

- the initial velocity is 8 m/s
- the acceleration is 3 m/s²
- the time is 5 seconds.

 u a t

$$V = 8 + 3(5)$$

$$V = 8 + 15$$

$$V = 23$$

23

..... m/s [2] ✓

11 Gill uses the formula

$$h = 2fg$$

(a) Find the value of h when $f = 1$ and $g = 3$.

A6

(a) $h = \dots\dots\dots$ [1]

(b) Find the value of g when $h = 18$ and $f = 6$.

A6

(b) $g = \dots\dots\dots$ [2]

11 Gill uses the formula

$$h = 2fg$$

(a) Find the value of h when $f = 1$ and $g = 3$.

A6

$$h = 2 \times 1 \times 3$$

(a) $h = \dots\dots\dots 6 \dots\dots\dots$ [1]

(b) Find the value of g when $h = 18$ and $f = 6$.

A6

$$18 = 2(6)g$$
$$18 = 12g$$

$$12g = 18$$
$$12 \times g = 18$$

$$18 \div 12$$

(b) $g = \dots\dots\dots 1.5 \checkmark \dots\dots\dots$ [2]

Video created by W Neill

- 4 Find the value of s when $u = 12$, $a = 10$ and $t = 4$.

$$s = ut + \frac{1}{2}at^2$$

..... [2]

4 Find the value of s when $u = 12$, $a = 10$ and $t = 4$.

$$t^2 = 4^2 = 16$$

Ab

$$s = ut + \frac{1}{2}at^2$$

$$ut = 12 \times 4 = 48$$

$$S = 48 + 80$$

$$\begin{aligned} \frac{1}{2}at^2 &= \left(\frac{1}{2}\right)(10)(16) \\ &= 80 \end{aligned}$$

$$128$$

..... [2]

1 Use the formula $s = ut + \frac{1}{2}at^2$.

Ab (a) Calculate s when $u = 5$, $t = 10$ and $a = 3$.

(a) $s = \dots\dots\dots$ [2]

1 Use the formula $s = ut + \frac{1}{2}at^2$.

A6 (a) Calculate s when $u = 5$, $t = 10$ and $a = 3$.

$$S =$$

$$ut = 5 \times 10 = 50$$

$$\begin{aligned} \frac{1}{2}at^2 &= \frac{1}{2}(3)10^2 \\ &= 150 \end{aligned}$$

$$50 + 150$$

$$(a) \quad s = \overset{200}{\dots\dots\dots} \quad [2]$$

Edexcel

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23 $S = \pi^2(b^2 - a^2)$

$a = 8, b = 10$

Calculate the value of S .

Give your answer correct to 3 significant figures.

.....
(Total for Question 5 is 2 marks)

11 $W = 5p + t$

Work out the value of W when $p = 6.2$ and $t = -4$

A6

$W = \dots\dots\dots$

(Total for Question 11 is 2 marks)

11 $W = 5p + t$

Work out the value of W when $p = 6.2$ and $t = -4$

A6

$$5p \dots 5 \times 6.2 = 31$$

$$31 + -4$$

$$31 - 4$$

$$W = \underline{27}$$

(Total for Question 11 is 2 marks)

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16 $v = u + at$

$$u = 1 \quad a = -3 \quad t = \frac{1}{2}$$

Work out the value of v .

$v = \dots\dots\dots$

(Total for Question 16 is 2 marks)

16 $v = u + at$ ^x

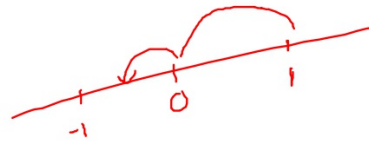
$u = 1$ $a = -3$ $t = \frac{1}{2}$

$-3 \times \frac{1}{2} = -1\frac{1}{2}$

Work out the value of v .

$V = 1 + -1\frac{1}{2}$

$V = 1 - 1\frac{1}{2}$



or -0.5 ✓

$v = -\frac{1}{2}$ ✓

(Total for Question 16 is 2 marks)

Video created by W Neill

11 $T = 4v + 3$

(a) Work out the value of T when $v = 2$

$T = \dots\dots\dots$
(2)

(b) Make v the subject of the formula $T = 4v + 3$

$\dots\dots\dots$
(2)

(Total for Question 11 is 4 marks)

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11 $T = 4v + 3$

(a) Work out the value of T when $v = 2$

$$T = 8 + 3$$

$$T = \underline{\underline{11}} \quad (2)$$

(b) Make v the subject of the formula $T = 4v + 3$

$$V \rightarrow \textcircled{\times 4} \rightarrow \textcircled{+ 3} \rightarrow T$$

$\leftarrow \quad \quad \leftarrow$
 $\quad -4 \quad \quad -3$

$$\begin{aligned} T &= 4v + 3 \\ T - 3 &= 4v \\ \frac{T - 3}{4} &= v \end{aligned}$$

$$v = \frac{T - 3}{4} \quad (2)$$

(Total for Question 11 is 4 marks)

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14 a and b are odd numbers.

(a) Give an example to show that the value of $2(a + b)$ is a multiple of 4

(2)

14 a and b are odd numbers.

(a) Give an example to show that the value of $2(a + b)$ is a multiple of 4

$$\begin{aligned} a &= 3 \\ b &= 5 \end{aligned}$$

$$2(3 + 5)$$

$$2(8)$$

$$= 16 \dots \text{multiple of } 4. \checkmark$$

(2)

16 $P = 4x + 3y$

$$x = 5$$

$$y = -2$$

(a) Work out the value of P .

A6

.....
(2)

(b) Expand $4e(e + 2)$

A10

.....
(2)

16 $P = 4x + 3y$

$$x = 5$$

$$y = -2$$

(a) Work out the value of P .

A6

$$4x = 4 \times 5 = 20$$

$$3y = 3 \times -2 = -6$$

$$20 + -6$$

$$20 - 6$$

$$\begin{array}{r} 14 \\ \hline (2) \end{array}$$

(b) Expand $4e(e + 2)$

A10

$$4e^2 + 8e$$

$$\begin{array}{r} 4e^2 + 8e \\ \hline (2) \end{array}$$

9 $g = 9$

$h = 4$

A6

Work out the value of $2g + 3h$

.....
(Total for Question 9 is 2 marks)

9 $g = 9$
 $h = 4$

A6

Work out the value of $2g + 3h$

$$2 \times g$$

$$2 \times 9$$

$$= 18$$

$$3 \times h$$

$$3 \times 4$$

$$= 12$$

$$18 + 12$$

$$30$$

(Total for Question 9 is 2 marks)

21 $v^2 = u^2 + 2as$

$u = 12$ $a = -3$ $s = 18$

(a) Work out a value of v .

A6

$$21 \quad v^2 = u^2 + 2as$$

$$u = 12 \quad a = -3 \quad s = 18$$

$$\begin{array}{r} 18 \\ \times 6 \\ \hline 108 \end{array}$$

(a) Work out a value of v .

A6

$$v^2 = 12^2 + 2(-3)(18)$$

$$v^2 = 144 + (-108)$$

$$v^2 = 36$$

$$v = \sqrt{36} =$$

$$\pm 6 \checkmark$$

(2)

5

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$$S = \pi^2(b^2 - a^2)$$

$$a = 8, b = 10$$

Calculate the value of S .

Give your answer correct to 3 significant figures.

$$S = \pi^2(100 - 64)$$

$$S = \pi^2(36) = 355.30$$

$$S =$$

355 ✓

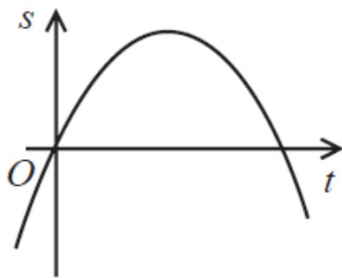
(Total for Question 5 is 2 marks)

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- 14** A particle P is moving in a straight line.
 O is a fixed point on the straight line.
The distance, s metres, of P from O at time t seconds is given by

$$s = 80t - 5t^2$$

Use algebra to find the greatest distance of P from O when $0 \leq t \leq 16$



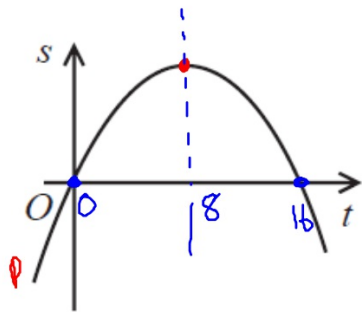
.....metres

(Total for Question 14 is 4 marks)

- 14 A particle P is moving in a straight line.
 O is a fixed point on the straight line.
 The distance, s metres, of P from O at time t seconds is given by

$$s = 80t - 5t^2$$

Use algebra to find the greatest distance of P from O when $0 \leq t \leq 16$



$$S = 80t - 5t^2$$

Sub $t=0$ $S=0$

$t=16$

16×80

1280

-1280
 $=0$

$$\begin{array}{r} 16 \\ \times 8 \\ \hline 1280 \end{array}$$

$$\begin{array}{r} 16 \\ \times 16 \\ \hline 96 \\ 160 \\ \hline 256 \times 5 \\ \times 5 \\ \hline 1280 \end{array}$$

Ans Sub in $t=8$

$$S = 80(8) - 5(8)^2$$

$$= 640 - 320$$

320 ✓ metres

$$\begin{array}{r} 64 \\ \times 5 \\ \hline 320 \end{array}$$

(Total for Question 14 is 4 marks)

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16 (a) Show that the equation $x^3 - 3x^2 + 3 = 0$ has a solution between $x = 2$ and $x = 3$

(2)

(b) Show that the equation $x^3 - 3x^2 + 3 = 0$ can be rearranged to give $x = \sqrt[3]{3x^2 - 3}$

(1)

16 (a) Show that the equation $x^3 - 3x^2 + 3 = 0$ has a solution between $x = 2$ and $x = 3$

$$x=2 \dots 2^3 - 3(2^2) + 3 = 8 - 12 + 3 = -1 \dots < 0$$

$$x=3 \dots 3^3 - 3(3^2) + 3 = 27 - 27 + 3 = 3 > 0$$

So this proves it has a solution between 2 and 3

(2)

(b) Show that the equation $x^3 - 3x^2 + 3 = 0$ can be rearranged to give $x = \sqrt[3]{3x^2 - 3}$

$$x = \sqrt[3]{3x^2 - 3}$$

$$x^3 = 3x^2 - 3$$

$$x^3 - 3x^2 + 3 = 0$$

(1)

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15 (a) Show that the equation $x^3 + 7x - 5 = 0$ has a solution between $x = 0$ and $x = 1$

(2)

15 (a) Show that the equation $x^3 + 7x - 5 = 0$ has a solution between $x = 0$ and $x = 1$

$$x=0 \dots 0^3 + 7(0) - 5 = -5$$

$$x=1 \dots 1^3 + 7 - 5 = 3 \quad -5 < 0 < 3$$

so the solution must be between

0 and 1 ✓

(2)

AQA

12 A football team has P points.

$$P = 3W + D$$

W is the number of wins

D is the number of draws

12 (a) A team has 6 wins and 2 draws.

A6
A8

How many points does the team have?

[1 mark]

Answer _____

A football team has P points.

$$P = 3W + D$$

W is the number of wins

D is the number of draws

12 (b) After 33 games a different team has 53 points.

AG 11 games were draws.

AS How many games has this team lost?

[4 marks]

Answer _____

12 A football team has P points.

$$P = 3W + D$$

W is the number of wins

D is the number of draws

12 (a)

A team has 6 wins and 2 draws.

How many points does the team have?

$$P = 3(6) + 2$$

$$P = 18 + 2$$

[1 mark]

Answer 20 ✓

A6
A8

19 The value of x can be 2 or 5
The value of y can be 3 or 12

19 (a) List the possible values of xy

[2 marks]

Ab

Answer _____

19 The value of x can be 2 or 5
The value of y can be 3 or 12

19 (b) Work out the **least** possible value of $\frac{x-y}{x}$

Ab

You **must** show your working.

[2 marks]

Answer _____

- 19 The value of x can be 2 or 5
The value of y can be 3 or 12

- 19 (a) List the possible values of xy times

[2 marks]

Ab

2×3	2×12	5×3	5×12
6	24	15	60

Answer 6, 24, 15, 60 ✓

- 19 The value of x can be 2 or 5
The value of y can be 3 or 12

19 (b) Work out the **least** possible value of $\frac{x-y}{x}$

Ab

You **must** show your working.

[2 marks]

$$\frac{2-12}{5} = \frac{-10}{5} = -2$$

$$\frac{-10}{2} = -5 \checkmark$$

Answer

-5

Smallest = $\frac{\text{Smallest}}{\text{biggest}}$

20 n is an odd number.
 p is a prime number.

In each part write down possible values of n and p so that

20 (a) $n + p$ is a square number.

[1 mark]

N17

N19

A6

$n =$ _____ $p =$ _____

n is an odd number.

p is a prime number.

In each part write down possible values of n and p so that

20 (b) np is a square number.

[1 mark]

N19

A6

$n =$ _____ $p =$ _____

- 20 n is an odd number.
 p is a prime number.

In each part write down possible values of n and p so that

- 20 (a) $n + p$ is a square number.

Squares = 1 4 9 16 25 36

[1 mark]

N17

N19

A6

Odd = 1 3 5 7 9 11 13 15

prime = 2, 3, 5, 7, 11, 13

$$n = \underline{1} \quad p = \underline{3} \quad \checkmark$$

n is an odd number.

p is a prime number.

In each part write down possible values of n and p so that

20 (b) np is a square number. ...

N19
A6

Squares = 1 4 9 16 25 36 [1 mark]

Odd = 1 3 5 7 9 11 13 15
prime = 2 3 5 7 11 13

V

$n =$ 3 $p =$ 3

25

Circle the expression for the range of n consecutive integers.

[1 mark]

A6
P2

$$\frac{n+1}{2}$$

$$n - 1$$

$$n$$

$$n + 1$$

25

Circle the expression for the range of n consecutive integers.

[1 mark]

A6
P2

$$\frac{n+1}{2}$$

$$n-1$$

$$n$$

$$n+1$$

$$\frac{4+1}{2} = \frac{5}{2} = 2\frac{1}{2} \quad \times$$

2, 3, 4, 5 $n = 4$ (numbers)

$$\text{Range} = 5 - 2 = 3 \quad \checkmark$$

4 The value of A is double the value of B .

A6

Circle the correct formula.

[1 mark]

$$A = B + 2$$

$$A = 2B$$

$$A = \frac{B}{2}$$

$$A = B^2$$

4 The value of A is double the value of B .

A6

Circle the correct formula.

[1 mark]

$$A = B + 2$$

$$10 = 5 + 2 \quad \times$$

$$A = 2B$$

$$10 = 2 \times 5 \quad \checkmark$$

$$A = \frac{B}{2}$$

$$10 = \frac{5}{2} \quad \times$$

$$A = B^2$$

$$10 = 5^2 \\ = 25 \quad \times$$

$$A = 10$$

$$B = 5$$

17 Here is a formula to convert degrees Celsius ($^{\circ}\text{C}$) to degrees Fahrenheit ($^{\circ}\text{F}$).

$$F = 1.8C + 32$$

F is the number of degrees Fahrenheit

C is the number of degrees Celsius

17 (a) Show that $-40^{\circ}\text{C} = -40^{\circ}\text{F}$

[2 marks]

A6

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Here is a formula to convert degrees Celsius ($^{\circ}\text{C}$) to degrees Fahrenheit ($^{\circ}\text{F}$).

$$F = 1.8C + 32$$

F is the number of degrees Fahrenheit

C is the number of degrees Celsius

17 (b) The temperature is -15°C

A6

Nick says,

“Because the temperature is negative in Celsius, it **must** be negative in Fahrenheit.”

Is he correct?

You **must** show your working.

[1 mark]

17 Here is a formula to convert degrees Celsius ($^{\circ}\text{C}$) to degrees Fahrenheit ($^{\circ}\text{F}$).

$$F = 1.8C + 32$$

F is the number of degrees Fahrenheit

C is the number of degrees Celsius

17 (a) Show that $-40^{\circ}\text{C} = -40^{\circ}\text{F}$

[2 marks]

A6

$$\begin{aligned} -40 &= (1.8 \times -40) + 32 \\ &= -40 \\ &\text{so proved } \checkmark \end{aligned}$$

Here is a formula to convert degrees Celsius ($^{\circ}\text{C}$) to degrees Fahrenheit ($^{\circ}\text{F}$).

$$F = 1.8C + 32$$

F is the number of degrees Fahrenheit

C is the number of degrees Celsius

17 (b) The temperature is -15°C

A6

Nick says,

"Because the temperature is negative in Celsius, it **must** be negative in Fahrenheit."

Is he correct?

You **must** show your working.

$$F = (1.8 \times -15) + 32 \quad [1 \text{ mark}]$$

$= 5^{\circ}\text{C}$ which is positive so
Nick is wrong.

12 $a - b = 5$

12 (a) Work out the value of $2(a - b)$

[1 mark]

A6

Answer _____

12 $a - b = 5$

12 (a) Work out the value of $2(a - b)$

[1 mark]

A6

2×5

Answer 10

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17 Circle the equation which has the solution $x = 6$

[1 mark]

A12/13

A6

$$x - 3 = \frac{x}{2}$$

$$x = \frac{3+x}{2}$$

$$3x = 36$$

$$\frac{x}{6} = 0$$

17 Circle the equation which has the solution $x = 6$

[1 mark]

A12/13
A6

$x - 3 = \frac{x}{2}$	$x = \frac{3+x}{2}$	$3x = 36$	$\frac{x}{6} = 0$
$6 - 3 = \frac{6}{2}$	$6 = \frac{3+6}{2}$	$3 \times 6 \neq 36$	$\frac{6}{6} = 0$
$3 = 3$	$6 = 4.5$	$= 18$	$1 = 0$

13

Here is a formula for the amount of water needed to cook rice.

Video created by W Neill

A6

$$w = 1.5r + 0.5$$

w is the number of cups of water needed

r is the number of cups of rice to be cooked

13 (a)

How many cups of water are needed to cook 7 cups of rice?

[2 marks]

Answer _____

Video created by W Neill

Here is a formula for the amount of water needed to cook rice.

$$w = 1.5r + 0.5$$

w is the number of cups of water needed

r is the number of cups of rice to be cooked

13 (b) How many cups of rice can be cooked with 20 cups of water?

[3 marks]

A6
A12/13

Answer _____

13

Here is a formula for the amount of water needed to cook rice.

Video created by W Neill

A6

$$w = 1.5r + 0.5$$

w is the number of cups of water needed

r is the number of cups of rice to be cooked

13 (a)

How many cups of water are needed to cook 7 cups of rice?

[2 marks]

$$w = 1.5(7) + 0.5$$

$$w = 11$$

Answer

11 ✓

Here is a formula for the amount of water needed to cook rice.

$$w = 1.5r + 0.5$$

w is the number of cups of water needed

r is the number of cups of rice to be cooked

13 (b) How many cups of rice can be cooked with 20 cups of water?

[3 marks]

A6
A12/13

$$20 = 1.5(r) + 0.5$$

$$\begin{array}{l} r \rightarrow \textcircled{\times 1.5} \rightarrow \textcircled{+ 0.5} \rightarrow 20 \\ 13 \leftarrow \textcircled{\div 1.5} \leftarrow \textcircled{- 0.5} \leftarrow 20 \end{array}$$

Answer

13 ✓

19 $a = 7$ and $b = 2$

A6 Work out the value of $\frac{a}{b} - a^b$

[3 marks]

Answer _____

19 $a = 7$ and $b = 2$

A6 Work out the value of $\frac{a}{b} - a^b$

$$a^b = 7^2 = 49$$

[3 marks]

$$\frac{a}{b} = \frac{7}{2} = 3.5$$

$$3.5 - 49$$

Answer -45.5 ✓

- 15** A company uses this formula to work out the cost, £ A , of a taxi ride.

$$A = 4 + 1.8m + b$$

£4 is a fixed charge

m is the number of miles travelled

£ b is a charge for booking online

- 15 (a)** Clare books a taxi online and travels 8 miles.
She pays £20 altogether.

A6

How much is the charge for booking online?

[3 marks]

Answer £ _____

- 15 A company uses this formula to work out the cost, £ A , of a taxi ride.

$$A = 4 + 1.8m + b$$

£4 is a fixed charge

m is the number of miles travelled

£ b is a charge for booking online

- 15 (a) Clare books a taxi online and travels 8 miles.
She pays £20 altogether.

A6

How much is the charge for booking online?

[3 marks]

$$\begin{aligned} & \text{£}4 + (1.8 \times 8 \text{ miles}) \\ & \text{£}14.40 = \text{£}18.40 \end{aligned}$$

Answer £ £1.60

Online fee

$$\text{£}20 - \text{£}18.40$$

22

$$k = n^2 + 9n + 1$$

Mo says,

A6

“ k will be a prime number for all integer values of n from 1 to 9”

Show that Mo is wrong.

You **must** show that your value of k is **not** prime.

[3 marks]

22

$$k = n^2 + 9n + 1$$

Mo says,

A6

" k will be a prime number for all integer values of n from 1 to 9"

Show that Mo is wrong.

You **must** show that your value of k is **not** prime.

[3 marks]

$$\begin{aligned} 1 \dots & 1^2 + 9(1) + 1 \\ & = 1 + 9 + 1 \\ & = 11 \checkmark \end{aligned}$$

$$\begin{aligned} 2 \dots & 4 + 18 + 1 \\ & 23 \checkmark \end{aligned}$$

$$3 \dots 9 + 27 + 1 = 37 \checkmark$$

$$\begin{aligned} 4 \dots & 16 + 36 + 1 \\ & = 53 \dots \text{prime} \end{aligned}$$

$$5 \dots 25 + 45 + 1 = 71 \checkmark$$

$$6 \dots 36 + 54 + 1$$

$$\begin{aligned} & = 91 \rightarrow \div 7 = 13 \\ & \text{not prime } \checkmark \end{aligned}$$

4 $y = \frac{10}{x}$

If the value of x doubles, what happens to the value of y ?

A6

Circle your answer.

[1 mark]

$\div 2$

$\times 2$

$\div 5$

$\times 5$

4 $y = \frac{10}{x}$

If the value of x doubles, what happens to the value of y ?

A6

Circle your answer.

[1 mark]

$\div 2$

$\times 2$

$\div 5$

$\times 5$

$y = \frac{10}{x}$ $y = \frac{10}{2x}$

$5 = \frac{10}{2}$ $2.5 = \frac{10}{4}$

$\div 2$

Video created by W Neill

3 Circle the point that does **not** lie on the curve $y = x^3$

[1 mark]

A6

$$\left(-\frac{1}{2}, -\frac{1}{8}\right)$$

$$(5, 125)$$

$$\left(\frac{1}{3}, \frac{1}{9}\right)$$

$$(-1, -1)$$

3 Circle the point that does **not** lie on the curve $y = x^3$

[1 mark]

A6

$$\begin{matrix} x & y \\ \left(-\frac{1}{2}, -\frac{1}{8}\right) \end{matrix}$$

$$-\frac{1}{8} = \left(-\frac{1}{2}\right)^3$$

$$= -\frac{1}{8} \checkmark$$

$$\begin{matrix} x & y \\ (5, 125) \end{matrix}$$

$$125 = 5^3$$

$$\checkmark$$

$$\begin{matrix} x & y \\ \left(\frac{1}{3}, \frac{1}{9}\right) \end{matrix}$$

$$\frac{1}{9} = \left(\frac{1}{3}\right)^3$$

$$= \frac{1}{27} \checkmark$$

$$(-1, -1)$$

$$-1 = -1^3$$

$$-1x - 1x - 1$$

$$= -1 \checkmark$$

28 $y = p \times q^{x-1}$ where p and q are numbers.

N54 $y = 10$ when $x = 1$

A6 $y = 0.3125$ when $x = 6$

Work out the value of y when $x = 3$

[5 marks]

Answer _____

28

$y = p \times q^{x-1}$ where p and q are numbers.

N54

$y = 10$ when $x = 1$ ✓

A6

$y = 0.3125$ when $x = 6$ ✓

Work out the value of y when $x = 3$

$$y = p \times q^{x-1}$$

$$10 = p \times q^{1-1}$$

$$10 = p \times q^0$$

$$10 = p \times 1$$

$$p = 10 ✓$$

$$y = p \times q^{x-1}$$

$$0.3125 = 10 \times q^{5}$$

$$0.03125 = q^5 \quad \downarrow \div 10$$

$$q = \frac{1}{2}$$

$$y = p \times q^{x-1}$$

$$y = 10 \times \left(\frac{1}{2}\right)^2$$

$$y = 10 \times \frac{1}{4}$$

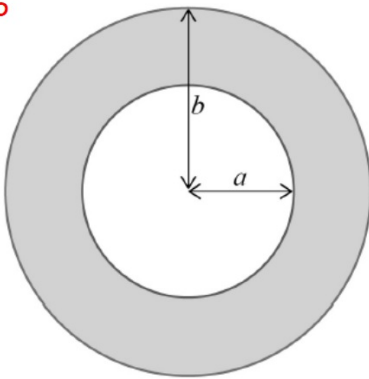
$$y = 2.5 ✓$$

Answer

$$y = 2.5 ✓$$

20 Here is an inflated swimming ring with dimensions in centimetres.

A6



The volume of the ring, $V \text{ cm}^3$, is given by

$$V = 0.25\pi^2(b - a)^2(b + a)$$

Work out the volume when $a = 20$ and $b = 30$

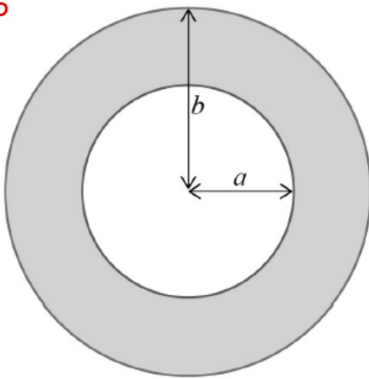
Give your answer to 3 significant figures.

[3 marks]

Answer _____ cm^3

20 Here is an inflated swimming ring with dimensions in centimetres.

A6



The volume of the ring, $V \text{ cm}^3$, is given by

$$V = 0.25\pi^2(b-a)^2(b+a)$$

Work out the volume when $a = 20$ and $b = 30$

Give your answer to 3 significant figures.

[3 marks]

$$V = 0.25\pi^2(30-20)^2(30+20)$$

$$V = 0.25\pi^2(100)(50)$$

$$V = 12337 \text{ cm}^3$$

Answer 12300 cm³ ✓ cm³