

Name:

Exam Style Questions

Substitution

Equipment needed: Calculator, pen

Guidance

1. Read each question carefully before you begin answering it.
2. Check your answers seem right.
3. Always show your workings

Video Tutorial

Video 20



Answers and Video Solutions



1. Find the value of $5c + 2$ if $c = 6$



$$30 + 2 = 32$$

.....
32
.....
(1)

2. Find the value of $4a - b$ when $a = 9$ and $b = 8$



$$36 - 8 = 28$$

.....
28
.....
(2)

3. Find the value of $12h + 9t$ when $h = 11$ and $t = 3$



$$132 + 27 = 159$$

.....
159
.....
(2)

4. Circle the expression that has the greatest value when $y = 10$



$2y$

$31 - y$

$y + 9$

$\frac{y}{2}$

20

21

19

5

(1)

5. If $x = 6$ and $y = -2$, find the value of



(a) x^2

$$6^2$$

$$\begin{array}{r} 36 \\ \hline \end{array} \quad (1)$$

(b) $5x + y$

$$30 + (-2)$$

$$\begin{array}{r} 28 \\ \hline \end{array} \quad (1)$$

(c) $x + y^2$

$$6 + (-2)^2$$

$$6 + 4$$

$$\begin{array}{r} 10 \\ \hline \end{array} \quad (1)$$

(d) $\frac{y + 20}{x}$

$$\frac{-2 + 20}{6}$$

$$\frac{18}{6}$$

$$\begin{array}{r} 3 \\ \hline \end{array} \quad (2)$$

6. $P = 2W + 2L$



Find P if $W = 3$ and $L = 9$

$$\begin{aligned} P &= 6 + 18 \\ &= 24 \end{aligned}$$

$$\begin{array}{r} 24 \\ \hline \end{array} \quad (2)$$

7. You are given that $m = 0.5$, $p = 0.75$ and $c = 2.2$



Find the value of

(a) $3c + m$

$$6.6 + 0.5$$

$$\underline{7.1}$$

(2)

(b) $m + p + c$

$$0.5 + 0.75 + 2.2 = 3.45$$

$$\underline{3.45}$$

(1)

8. The cost of hiring a hot tub is found using the formula



Hire cost = £50 plus an extra £45 per day

(a) Work out the hire cost for hiring the hot tub for 21 days.

$$50 + 21 \times 45$$

$$50 + 945 = 995$$

$$\underline{\pounds 995}$$

(2)

Alex hires the hot tub for a number of days and the cost is £545

(b) How many days did Alex hire the hot tub?

$$545 - 50 = 495$$

$$495 \div 45 = 11$$

$$\underline{11 \text{ days}}$$

(2)

9. This formula can be used to convert between Celsius (C) and Fahrenheit (F).



$$F = 1.8C + 32$$

- (a) Convert 2°C into Fahrenheit

$$1.8 \times 2 + 32$$

$$3.6 + 32 = 35.6$$

$$\frac{35.6^{\circ}\text{F}}{\dots\dots\dots}$$

(2)

- (b) Convert 50°F into Celsius

$$50 - 32 = 18$$

$$18 \div 1.8 = 10$$

$$\frac{10^{\circ}\text{C}}{\dots\dots\dots}$$

(2)

-
10. Given that $a = 4$, $b = 9$ and $c = -5$



Work out the value of

$$\frac{ab + 24}{2c}$$

$$\frac{36 + 24}{-10}$$

$$\frac{60}{-10} = -6$$

$$\frac{-6}{\dots\dots\dots}$$

(3)

11. (a) Find the value of $5(a + c)$ when $a = 4$ and $c = 9$



$$5(13)$$

$$\begin{array}{r} 65 \\ \hline \end{array} \quad (2)$$

- (b) Find the value of $7x + 2y$ when $x = 2$ and $y = -9$

$$14 + (-18)$$

$$\begin{array}{r} -4 \\ \hline \end{array} \quad (2)$$

12. $P = 2W + 2L$



Find W if $P = 30$ and $L = 11$

$$30 = 2W + 22$$

$$2W = 8$$

$$W = 4$$

$$\begin{array}{r} 4 \\ \hline \end{array} \quad (2)$$

13. $y = w - 2a^2$



$$w = 400$$

$$a = 5$$

Work out the value of y

$$\begin{aligned} y &= 400 - 2a^2 \\ y &= 400 - 2 \times 5^2 \\ &= 400 - 2 \times 25 \\ &= 400 - 50 \end{aligned}$$

$$\begin{array}{r} 350 \\ \hline \end{array} \quad (2)$$

14. The cost in pounds, C , of hiring a car is given by
 $C = 25d + 45$



where d is the number of days the car is hired.

- (a) Find C if $d = 4$

$$25 \times 4 + 45$$

$$100 + 45$$

$$\underline{\hspace{1cm}} \\ \pounds 145$$

(2)

- (a) Find d if $C = 245$

$$245 - 45 = 200$$

$$200 \div 25 = 8$$

$$\underline{\hspace{1cm}} \\ 8 \text{ days}$$

(2)

-
15. $W = 2x + 5y$



- (a) Work out the value of W when $x = 8$ and $y = -3$

$$16 + (-15)$$

$$\underline{\hspace{1cm}} \\ 1$$

(2)

- (b) Work out the value of x when $W = 59$ and $y = 7$

$$59 = 2x + 35$$

$$24 = 2x$$

$$x = 12$$

$$\underline{\hspace{1cm}} \\ 12$$

(2)

16. The amount of medicine, s ml, to give to a puppy, up to 18 months old, can be worked out using the formula.



$$s = \frac{am}{18}$$

s is the amount of medicine, in ml.
 a is the dose for an adult dog, in ml.
 m is the age of the puppy, in months.

A puppy is 3 months old.
An adult dog's dose is 45ml.

Work out the amount of medicine the puppy should be given.

$$\begin{aligned} s &= \frac{45 \times 3}{18} \\ &= \frac{135}{18} \\ &= 7.5 \text{ ml} \end{aligned}$$

.....ml
(3)

- 17.



$$m = abc$$

Find m if $a = 3$, $b = -8$ and $c = 2$

$$\begin{aligned} m &= 3 \times (-8) \times 2 \\ &= -48 \end{aligned}$$

.....
(2)

18. Heidi is a plumber.



She uses this formula to work out the cost to charge her customers.

$$C = 40h + p + 0.5d$$

C is the total cost of the job, in pounds.

h is the number of hours worked.

p is the cost of any parts used, in pounds.

d is the distance travelled, in miles.

Heidi's last job took 3 hours and the cost of the parts used was £17.50

The total cost of the job was £156

Work out how far Heidi travelled in miles.

$$156 = 120 + 17.50 + 0.5d$$

$$156 = 137.5 + 0.5d$$

$$18.5 = 0.5d$$

$$d = 37$$

.....37.....miles
(3)

19. $x + 3 = 10$



Work out the value of $\frac{5x - 3}{4}$

$$x = 7$$

$$\frac{5 \times 7 - 3}{4}$$

$$\frac{35 - 3}{4}$$

$$\frac{32}{4}$$

.....8.....
(2)

20. $v = u + at$



(a) Work out v when $u = 23$, $a = 4$ and $t = 3$

$$\begin{aligned}v &= 23 + 12 \\ &= 35\end{aligned}$$

$$\begin{array}{r}35 \\ \hline\end{array} \quad (2)$$

(b) Work out u when $v = 30$, $a = 2$ and $t = 8$

$$\begin{aligned}30 &= u + 16 \\ u &= 14\end{aligned}$$

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

(c) Work out t when $v = 40$, $u = 12$ and $a = 4$

$$\begin{aligned}40 &= 12 + 4t \\ 28 &= 4t \\ t &= 7\end{aligned}$$

$$\begin{array}{r}7 \\ \hline\end{array} \quad (2)$$

21. $2x - y = 17$



(a) Work out the value of $6x - 3y$

$$17 \times 3$$

$$\begin{array}{r}51 \\ \hline\end{array} \quad (2)$$

(b) Work out the value of $y - 2x$

$$\begin{array}{r}-17 \\ \hline\end{array} \quad (1)$$

22. $y = 7x^2$



Explain what happens to the value of y when the value of x doubles.

let $x = 10$

$$y = 7 \times 10^2$$

$$= 7 \times 100$$

$$= 700$$

$x = 20$

$$y = 7 \times 20^2$$

$$= 7 \times 400$$

$$= 2800$$

$$2800 \div 700 = 4$$

When x is doubled, y is 4 times larger.

(2)

23.

$$y = \frac{800}{x^3}$$



let $x = 1$

$$y = \frac{800}{1} = 800$$

$x = 2$

$$y = \frac{800}{8} = 100$$

Explain what happens to the value of y when the value of x doubles.

When x doubles, y is 8 times smaller.

(2)

24. Calculate the value of $x^y - y^x$



when $x = 3$ and $y = 6$

$$3^6 - 6^3$$

$$729 - 216 = 513$$

513

(2)

25. $80 = 2mn$



m and n are negative integers.

Write down a pair of possible values for m and n.

any from:

$$40 = mn$$

- 1
 - 2
 - 4
 - 5
 - 8
 - 10
 - 20
 - 40
- 40
 - 20
 - 10
 - 8
 - 5
 - 4
 - 2
 - 1

m = and n = (2)

26. $y = (x - 5)(x + 1)$



Find y if $x = -3$

$$y = (-8)(-2) = 16$$

16 (2)

27. $w = \frac{x}{2y}$



$$4w + 3y = 30$$

Work out the value of x when $y = 4$

$$4w + 12 = 30$$

$$4w = 18$$

$$w = 4.5$$

$$4.5 = \frac{x}{8}$$

$$x = 36$$

36
.....
(3)