Substitution, Solving & Rearranging Equations

A collection of 9-1 Maths GCSE Sample and Specimen questions from AQA, OCR and Pearson-Edexcel.

Name:	
Total Marks:	

1. Solve.

   $3x^2 = 75$

   x = ... [2]

2. Solve.

   $3x + 7 = 19$

   x = ... [2]

3. Here is a formula.

   T = 5r + 3u

   Work out the value of T when r = 8 and u = 9.

   ..... [2]

4. Six equations are shown below, each labelled with a letter.

A	B	C
$y = -6x$	$x = \frac{1}{6}y$	$y = \frac{-3}{x}$
D	**E**	**F**
$x = \frac{6}{y}$	$y = 6x$	$y = \frac{2}{x} + 2$

Choose the correct letters to make this statement true.

Equation B and equation ..... are equivalent. [1]

5. Solve.

$5x = 2x + 18$

x = ... [2]

6. (a) Solve.

(i) $2x = 18$

(a)(i) x = ... [1]

(ii) $x + 2 = 5$

(ii) x = ... [1]

(iii) $\frac{x}{3} = 15$

(iii) x = ... [1]

(b) (i) Find the value of t when g = 4 and h = 7.

$t = 12g - 5h$

(b)(i) t = ... [2]

(ii) Rearrange to make r the subject.

$4r - p = q$

(ii) ..... [2]

7. Show that $3r = 2(5k^2 - 2r)$ can be rearranged to $k = \sqrt{\frac{7r}{10}}$

[4]

8. Find the value of a − b when a = 3 and b = -2.

..... [1]

9. Solve.

3a + 10 = a + 40

a = ... [3]

10. Here are three expressions.

$\frac{b}{a}$ $b - a$ ab

When a = 2 and b = - 6 which expression has the smallest value?

You must show your working.

[2]

11. Kelly is trying to work out the two values of w for which $3w - w^3 = 2$

Her values are 1 and -1

Are her values correct?

You must show your working.

[2]

12. Solve 4x + 5 = x + 26

x = ...

[2]

13. Solve 3x – 5 = 9

x = ...

[2]

14. f = 5x + 2y

x = 3 and y = −2

Find the value of f.

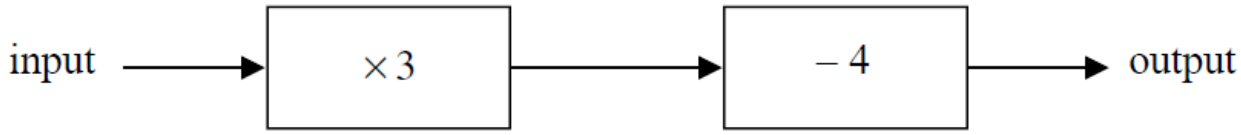
..... [2]

15. $q = \frac{p}{r} + s$

Make p the subject of this formula.

..... [2]

16. Here is a number machine.



(a) Work out the output when the input is 4

..... [1]

(b) Work out the input when the output is 11

..... [2]

(c) Show that there is a value of the input for which the input and the output have the same value.

[2]

17. Solve 3x + 7 = 1

x = ... [2]

18. f = 6, g = 5

Work out the value of 3f – 2g

..... [2]

19. Solve 5p = 3p + 8

..... [2]

20. Make t the subject of the formula $y = \frac{t}{3} - 2a$

..... [2]

21. (a) Alan is looking at number machine problems.

He says,

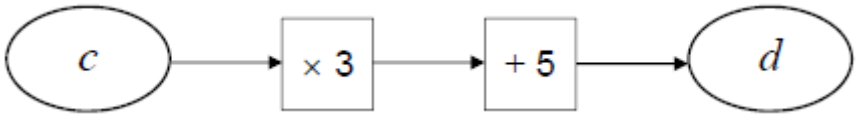
"If I know y I can work out x. I subtract 3 then I add 5."

Does this method work?

Give a reason for your answer.

[1]

(b)



He says,

"If I know d I can work out c. I divide by 3, then subtract 5."

Does this method work?

Give a reason for your answer.

[1]

22. Solve 5w - 11 = 24

[2]

23. A company has bikes for hire.

The cost, £C, to hire a bike for n days is given by the formula

$$C = 12 + \frac{27}{4}(n - 1)$$

(a) Write down the cost to hire a bike for 1 day.

[1]

(b)

Special offer

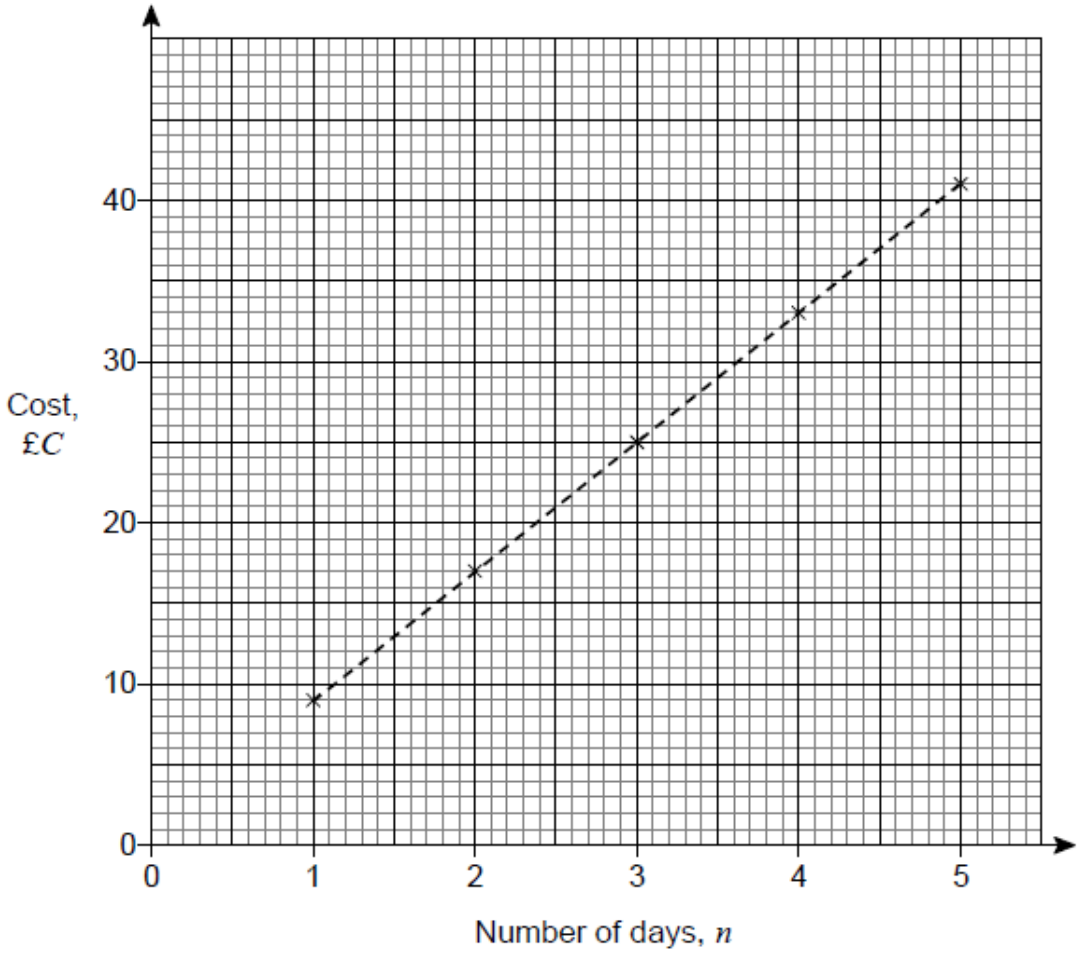
Hire a bike for £9 per day

Is it cheaper to hire a bike for 7 days using the special offer?

You must show your working.

[2]

(c) The graph shows the cost to hire a bike for one to five days at a different company.



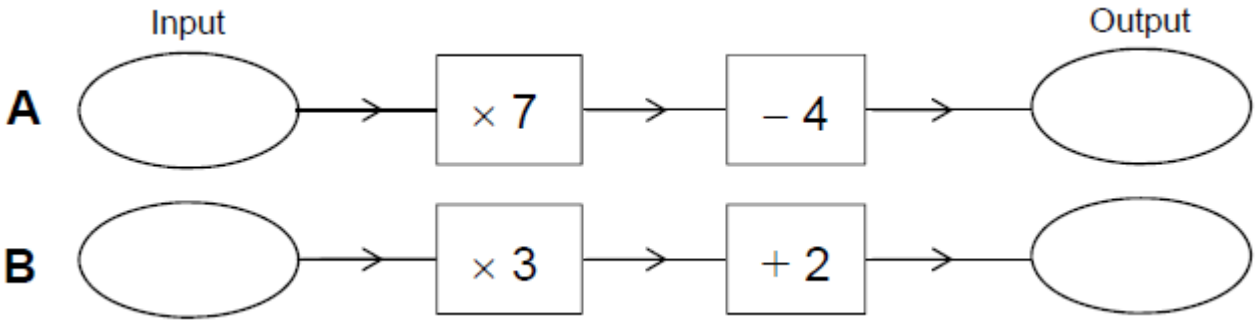
The cost, £C, to hire a bike for n days using this company is given by the formula

$$C = a + b(n - 1)$$

Work out the values of a and b.

a = _____ b = _____ [3]

24. Here are two number machines, A and B.



Both machines have the same input.

Work out the input that makes the output of A three times the output of B.

[4]

25. Solve 4(x + 5) = 15

[3]

26. Work out the value of 5x + 9y when x = 7 and y = –2

[2]

27. Solve 4x - 5 = 17

[2]

28. Here is a formula.

$$V = \frac{1}{2} x^2 h$$

Work out the value of V when $x = 11$ and $h = 6$

[2]

29. Solve 12x = 3

Circle your answer.

[1]

x = -9 $\quad$ x = $\frac{1}{4}$ $\quad$ x = 4 $\quad$ x = 36

30. You are given that a = 3 and b = 5

Tick whether each statement is true or false.

Give a reason for each answer.

Statement	True	False	Reason
$ab = 35$			
$2b^2 = 100$			

[2]