Substitution

Exam Style Questions

1. (a) $P = 3q + 4$

Work out the value of P when $q = 3$.

$P = 3(3) + 4$

$= 9 + 4 = 13$

13 ..... (1)

(b) $Q = 2a - 3b$

Work out the value of Q when $a = -2$ and $b = 3$.

$Q = 2(-2) - 3(3)$

$= -4 - 9 = -13$

-13 ..... (2)

(3 marks)

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2. (a) $x = 2 + 2z$

Find the value of x when $z = 7$.

$x = 2 + 2(7)$

$= 2 + 14$

$= 16$

16 ..... (1)

(b) $p = -3r + 2s$

Work out the value of P when $r = -2$ and $s = 8$.

$P = -3(-2) + 2(8)$

$= 6 + 16$

$= 22$

22 ..... (2)

(3 marks)

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3. (a) $y = 7x - 4$

Work out the value of y when $x = 2$

$y = 7(2) - 4$

$= 14 - 4 = 10$

10 ..... (1)

(b) $a = b + 2c$

Work out the value of a when $b = -2$ and $c = -3$

$a = -2 + 2(-3)$

$= -2 - 6 = -8$

-8 ..... (2)

(3 marks)

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4. (a) $x = \frac{3a+4b}{2c}$

Find the value of x when $a = 2$, $b = 3$ and $c = 7$.

$x = \frac{3(2)+4(3)}{2(7)} = \frac{6+12}{14} = \frac{18}{14} = \frac{9}{7}$

$\frac{9}{7}$ ..... (2)

(b) $x = \frac{2(a+1)}{3}$

Find the value of x when $a = 11$.

$x = \frac{2(11+1)}{3} = \frac{2(12)}{3} = \frac{24}{3} = 8$

8 ..... (1)

(3 marks)

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5. (a) $x = abc$

Find the value of x when $a = 4$, $b = -3$ and $c = -2$.

$x = 4 \times -3 \times -2$

$= 24$

24 ..... (1)

(b) $A = a + bc$

Find the value of c when $A = 10$, $a = 2$ and $b = 2$.

$10 = 2 + 2c$

$8 = 2c \Rightarrow c = 4$

$c = 4$ ..... (2)

(3 marks)

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6. (a) $x = y^2 - 1$

Find the value of x when $y = 3$.

$x = (3)^2 - 1$

$= 9 - 1 = 8$

8 ..... (1)

(b) $p = 2q^3 + r$

Find the value of p when $q = -2$ and $r = 7$.

$p = 2(-2)^3 + 7$

$= 2(-8) + 7$

$= -16 + 7 = -9$

-9 ..... (2)

(3 marks)

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7. (a) $X = 3Y + 9$

Find the value of Y when $X = 21$.

$21 = 3Y + 9$

$12 = 3Y \Rightarrow Y = 4$

$Y = 4$ ..... (1)

(b) $a = 4b - c$

Find the value of b when $a = 7$ and $c = 5$.

$7 = 4b - 5$

$12 = 4b \Rightarrow b = 3$

$b = 3$ ..... (2)

(3 marks)

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8. (a) $y = mx + c$

Find the value of y when $x = 2$, $m = 3$ and $c = -8$.

$y = 3(2) - 8$

$= 6 - 8 = -2$

-2 ..... (1)

(b) $E = mc^2$

Find the value of E when $c = -5$ and $m = 10$.

$E = 10(-5)^2$

$= 10 \times 25$

$= 250$

250 ..... (2)

(3 marks)

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9. A turkey has the following cooking instructions:

$$t = 70 + 20w$$

t represents the time in minutes.
w represents the weight of the turkey in kilograms.

(a) Work out how long it will take to cook a turkey that weighs $2.5kg$. Give your answer in minutes.

$t = 70 + 20(2.5)$
$= 70 + 50$
$= 120$

..120..... minutes (1)

(b) Susan cooks her turkey for 3 hours. Assuming Susan followed the cooking instructions correctly, work out the weight of Susan's turkey. Give your answer in kilograms.

$180 = 70 + 20w$
$110 = 20w$
$w = \frac{110}{20} = 5.5$

..5.5..... kilograms (2)

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10. The dosage of a children's medine is given by the following formula:

$$D = 2.5 + 2.5a$$

D is the dosage in ml
a is the age of the child in years.

(a) Work out the dosage suitable for a two year old child.

$D = 2.5 + 2.5(2)$
$= 2.5 + 5$
$= 7.5$

7.5 ..... ml (2)

(b) If the recommended dosage is 20ml or more, children should start using an alternate, more age appropriate medicine. At what age should children start using the alternative medicine? Give your answer in years.

$20 = 2.5 + 2.5a$
$17.5 = 2.5a$
$a = \frac{17.5}{2.5} = 7$

7 ..... years (2)
