

Changing the Subject of a Formula Exam Practice



Q1. Make a the subject of the formula, $ab = c$

$$a = \frac{c}{b}$$

Answer: $a = \frac{c}{b}$
(1 mark)

Q2. Make b the subject of the formula, $\frac{a}{b} = c$

$$a = bc$$
$$\frac{a}{c} = b$$

Answer: $b = \frac{a}{c}$
(1 mark)

Q3. Make p the subject of the formula, $p + q = r$

$$p = r - q$$

Answer: $p = r - q$
(2 marks)



Q4. Make u the subject of the formula, $uv - q = r$

$$uv = r + q$$

$$u = \frac{r+q}{v}$$

Answer: $u = \frac{r+q}{v}$
(2 marks)

Q5. Make f the subject of the formula, $g + f^2 = h$

$$f^2 = h - g$$

$$f = \sqrt{h-g}$$

Answer: $f = \sqrt{h-g}$
(2 marks)

Q6. Make a the subject of the formula, $c + \frac{a}{b} = d$

$$\frac{a}{b} = d - c$$

$$a = b(d - c)$$

Answer: $a = b(d - c)$
(3 marks)



Q7. Make r the subject of the formula, $\frac{r}{3s} = 2c$

$$r = 6sc$$

Answer: $r = 6sc$
(1 mark)

Q8. Make p the subject of the formula, $ap + q = r$

$$ap = r - q$$

$$p = \frac{r - q}{a}$$

Answer: $p = \frac{r - q}{a}$
(2 marks)

Q9. Make c the subject of the formula, $a = -b + c$

$$a + b = c$$

Answer: $c = a + b$
(2 marks)



Q10. Make a the subject of the formula, $\sqrt{a-b} = c$

$$a-b = c^2$$
$$a = c^2 + b$$

Answer: $a = c^2 + b$
(2 marks)

Q11. Make m the subject of the formula, $l = 3m - 2n$

$$l + 2n = 3m$$
$$\frac{l + 2n}{3} = m$$

Answer: $m = \frac{l + 2n}{3}$
(4 marks)

Q12. Make f the subject of the formula, $gf^3 = h$

$$f^3 = \frac{h}{g}$$
$$f = \sqrt[3]{\frac{h}{g}} \quad \text{or} \quad f = \left(\frac{h}{g}\right)^{\frac{1}{3}}$$

Answer: $f = \sqrt[3]{\frac{h}{g}}$
(2 marks)



Q13. Here is a formula: $2x + \frac{3}{5}y = z$

(a) make x the subject

$$2x = z - \frac{3}{5}y$$

$$x = \frac{z}{2} - \frac{3}{10}y$$

Answer: $x = \frac{z}{2} - \frac{3}{10}y$
(2 marks)

(b) make y the subject

$$\frac{3}{5}y = z - 2x$$

$$3y = 5z - 10x$$

$$y = \frac{5z - 10x}{3}$$

Answer: $y = \frac{5z - 10x}{3}$
(2 marks)



Applied Mixed Practice Problems

Q14. Roger runs a taxi firm. He charges customers £3 for each mile he drives, as well as a fixed charge of 50p. Let C be the total cost paid by a customer in pounds.

(i) Write down a formula for C if a customer travels m miles

$$C = 3m + 0.50$$

Answer: $C = 3m + 0.50$
(2 marks)

(ii) Find a formula for the number of miles travelled if the cost paid is C pounds.

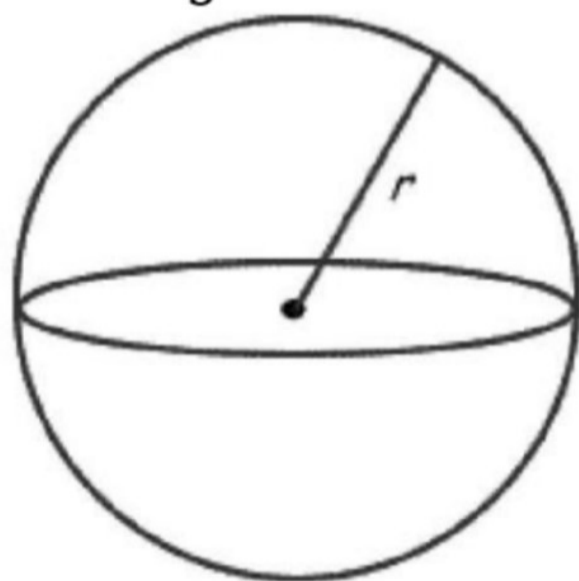
$$C = 3m + 0.5$$

$$C - 0.5 = 3m$$

$$\frac{C - 0.5}{3} = m$$

Answer: $m = \frac{C - 0.5}{3}$
(2 marks)

Q15. Below is a sphere, radius r . The formula for the volume V of the sphere is $V = \frac{4}{3}\pi r^3$. Work out a formula for the radius of a sphere with volume V .



$$3V = 4\pi r^3$$

$$\frac{3V}{4\pi} = r^3$$

$$\sqrt[3]{\frac{3V}{4\pi}} = r$$

Answer: $r = \sqrt[3]{\frac{3V}{4\pi}}$
(3 marks)



Q16. The circumference c of a circle has the formula as $C = \pi d$ where d is the diameter. Find a formula for r where r is the radius of the circle.

$$C = 2\pi r$$

$$\frac{C}{2\pi} = r$$

Answer: $r = \frac{C}{2\pi}$
(3 marks)

Q17. Temperature is measured in Centigrade C, Fahrenheit F or Kelvins (K).

We have the following formulae: $C = K - 273$, and
 $F = 1.8C + 32$

a) Find a formula to convert degrees F to C

$$F = 1.8C + 32$$

$$F - 32 = 1.8C$$

$$\frac{F - 32}{1.8} = C$$

Answer: $C = \frac{F - 32}{1.8}$
(2 marks)

b) Hence, or otherwise, find a formula to convert K to F

$$\left. \begin{array}{l} C = \frac{F - 32}{1.8} \\ C = K - 273 \end{array} \right\} K - 273 = \frac{F - 32}{1.8}$$

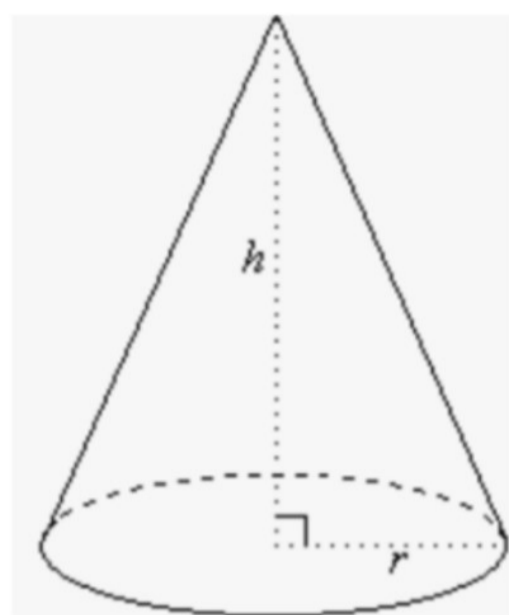
$$\Rightarrow 1.8(K - 273) = F - 32$$

$$\Rightarrow 1.8(K - 273) + 32 = F$$

Answer: $F = 1.8(K - 273) + 32$
(2 marks)



Q18. The volume V of a cone is given by $\frac{1}{3}\pi r^2 h$. Find a formula for the radius r .



$$V = \frac{1}{3} \pi r^2 h$$

$$3V = \pi r^2 h$$

$$\frac{3V}{\pi h} = r^2$$

$$\sqrt{\frac{3V}{\pi h}} = r$$

Answer: $r = \sqrt{\frac{3V}{\pi h}}$

(3 marks)