

IGCSE higher

Week 3 homework

1 Factorise the following expressions

- a) $3x + 6$ b) $21y - 35$ c) $18 + 27b$ d) $7y - y^2$ e) $3x - x^2$
 f) $xy + 2x^2$ g) $4a + 20a^2$ h) $16b^2 + 24b$ i) $ax + bx$ j) $3cm - dm$
 k) $x^2y + xy$ l) $5a^2y + 10ay^3$ m) $a^3bc^2 - 4abc$ n) $24m^3n^2 + 32m^2n^3o$ o) $5abd - 4cd$

2 In these two shapes you are given one side and the area. Use this information to find the other side and the perimeter

hint: think of factorising the area



$$\text{Area} = 4xy + 2y^2$$



$$\text{Area} = 9a^2 - 3ab$$

3 Make x the subject of the formula

- a) $x + v = T$ b) $mx - r = K$ c) $at = kx - 2t$ d) $v^2x = b$ e) $m(1 + x) = N$
 f) $gx - tr = y$ g) $y = mx + c$ h) $m - x = P$ i) $ty = n - x$ j) $n(a - x) = rs$
 k) $t = \frac{x - 5}{r}$ l) $m = \frac{2x}{3}$ m) $d = \frac{ax + b}{c}$ n) $jx^2 = kl$ o) $4x^2 - y = m$
 p) $x(d + m) = M$ q) $\frac{x}{(v - 1)} = k$ r) $\frac{h}{x} = a$ s) $ab = \frac{m^2}{x}$
 t) $v(x) = t$ u) $v(x - a) = b$

4 Make r the subject of the formula

- a) $2sr - t = m^2k$ b) $2r^2h = V$ c) $ax/r = tu$ d) $ab - sr = d$ e) $v(s + r) = ts$

5 Make x the subject of the formula

- a) $x(a + d) = T$ b) $uv = x(5 - a)$ c) $ax + t = bx + r$ d) $mx + Y = T - kx$
 e) $m(x - 5) = n(x + 3)$ f) $\frac{T - x}{T + x} = m$ g) $y + x = \frac{x - r}{s}$ h) $r(s + x) = t(u - x)$

6 Rewrite each statement using a constant k to connect each pair of variables

- a) $y \propto x$ b) $P \propto t$ c) $A \propto L$ d) $n \propto m^2$ e) $R \propto \sqrt{s}$

7 y is proportional to x so that $y = kx$. If $y = 12$ when $x = 4$

- a) find the value of k b) find the value of y when $x = 8$
 c) find the value of x when $y = 9$

8 t is proportional to s. If $t = 20$ when $s = 4$

- a) find the formula that connects them
 b) find t when $s = 7$ c) find s when $t = 55$

9 B varies directly as m^2 . If $B = 12$ when $m = 2$

- a) find the formula that connects them
 b) find B when $m = 5$ c) find m when $B = 48$

10 Given that $t \propto a^2$ If $t = 4$ when $a = 1$

- a) find t when $a = 5$ b) find a when $t = 36$

- 11** The pressure of the water P at any point below the surface of the sea varies as the depth of the point below the surface, d . If the pressure is 200 newtons/cm at depth of 5 m, calculate the pressure at a depth of 8 m
- 12** The energy, E stored in an elastic band is proportional to the square of the extension, x , when the elastic is extended by 3cm, the energy stored is 243 joules
 a) what is the energy stored when the extension is 5cm
 b) what is the extension when the stored energy is 108 joules
- 13** Rewrite the statements connecting the variables using a constant of variation k
 a) $y \propto 1/x$ b) $p \propto 1/m$ c) $y \propto 1/x^2$ d) $R \propto 1/vs$
- 14** Y is inversely proportional to X . If $Y = 10$ when $X = 2$
 a) find the formula that connect Y to X
 b) find Y when $X = 5$ c) find X when $Y = 40$
- 15** d varies inversely as c . If $d = 6$ when $c = 2$ calculate
 a) d when $c = 12$ b) c when $d = 3$
- 16** p is inversely proportional to \sqrt{r} If $p = 1.2$ when $r = 100$ calculate
 a) the value of p when $r = 4$ b) the value of r when $p = 3$
- 17** Given that $v \propto 1/t^2$
 copy and complete the table
- | | | | | |
|-----|----|---|-----|----|
| t | 2 | 5 | | 10 |
| v | 25 | | 1/4 | |
- 18** The volume of a given mass of gas varies inversely as the pressure P
 when $V = 2 \text{ m}^3$ $P = 500 \text{ N/m}^2$
 a) Find the volume when the pressure is 400 N/m^2
 b) Find the pressure when the volume is 5 m^3
- 19** The force of attraction F between two magnets varies inversely as the square of the distance d between them. When the magnets are 2 cm apart, the force of attraction is 18 newtons. How far apart are they if the attractive force is 2 newtons?
- 20** The mass of a carbon atom is $1.994 \times 10^{-23} \text{ g}$
 How many atoms of carbon are there in a sample weighing 20g?
 Give your answer in standard form correct to 2 d.p.
- 21** Factorise the following quadratic equations
 a) $x^2 - 5x + 6 = 0$ b) $x^2 - 3x - 28 = 0$ c) $x^2 - 49 = 0$
- 22** Simplify the following
 a) $(x^{2/3})^3$ b) $(64x^9)^{1/3}$ c) $(x^{12}y^{20})^{-1/4}$ d) $(81x^2)^{1/4}$
- 23** Mary is travelling to New York, she wants to buy a camera, in London the price is £355
 In New York the price is \$465
 If the exchange rate is £0.76 = \$1
 Where should she buy the camera to get the cheapest price?