Revision!

Indices

1) $x^p \times x^q = x^{p+q}$

2) $x^p \div x^q = x^{p-q}$

3) $(x^p)^q = x^{p \times q}$

4) $x^1 = x$

5) $x^0 = 1$

6) $x^{-p} = \frac{1}{x^p}$

7) $x^{\frac{1}{p}} = \sqrt[p]{x}$

8) $x^{p/q} = (\sqrt[q]{x})^p$ or $\sqrt[q]{x^p}$

Examples

1) $x^5 \times x^3 = x^{5+3} = x^8$

2) $x^{20} \div x^5 = x^{20-5} = x^{15}$

3) $(4x^4)^2 = 16x^8$

4) $7^1 = 7$

5) $5^0 = 1$

6) $3^{-3} = \frac{1}{3^3} = \frac{1}{27}$

7) $8^{\frac{1}{3}} = \sqrt[3]{8} = 2$

8) $4^{5/2} = (\sqrt[2]{4})^5$

$= 2^5 = 32$

Exercise

1) $3x^4 \times 4x^3 = 12x^7$

2) $18x^7 \div 6x^2 = 3x^5$

3) $(2p^2)^3 = 2p^2 \times 2p^2 \times 2p^2 = 8p^6$

4) $9^0 = 1$

5) $2^1 = 2$

6) $64^{\frac{1}{2}} = \sqrt[2]{64} = 8$

7) $4^{-2} = \frac{1}{4^2} = \frac{1}{16}$

8) $16^{3/4} = (\sqrt[4]{16})^3 = 2^3 = 8$

9) $\dfrac{y^8 \times y^5}{y^2} = \dfrac{y^{13}}{y^2} = y^{11}$

10) $\dfrac{4y^3 \times 3y^2}{2y} = \dfrac{12y^5}{2y} = 6y^4$

Further Examples

$\left(\dfrac{25}{64}\right)^{-\frac{1}{2}} = \left(\dfrac{64}{25}\right)^{\frac{1}{2}} = \sqrt{\dfrac{64}{25}} = \dfrac{\sqrt{64}}{\sqrt{25}} = \dfrac{8}{5}$

Exercise

1) $27^{2/3} = \left(\sqrt[3]{27}\right)^2 = 3^2 = 9$

2) $16^{3/2} = \left(\sqrt[2]{16}\right)^3 = 4^3 = 64$

3) $8^{4/3} = \left(\sqrt[3]{8}\right)^4 = 2^4 = 16$

4) $125^{2/3} = \left(\sqrt[3]{125}\right)^2 = 5^2 = 25$

5) $36^{3/2} = \left(\sqrt[2]{36}\right)^3 = 6^3 = 216$

Evaluating Quadratic Expressions

$x^2 + 3x - 2$

$x = -2$

$(-2)^2 + 3(-2) - 2$

$+4 - 6 - 2$

$= -4$

$x = 3$

$3^2 + 3(3) - 2$

$9 + 9 - 2$

$= 16$

$x^2 - x + 4$

$(-2)^2 - (-2) + 4$
$+4 + 2 + 4$
$= +10$

$3^2 - 3 + 4$
$9 - 3 + 4$
$= 10$

$x^2 - 3x - 1$

$(-2)^2 - 3(-2) - 1$
$+4 + 6 - 1$
$= 9$

$3^2 - 3(3) - 1$
$9 - 9 - 1$
$= -1$

Rearranging Formulae

Ex 1 $\quad y = 3x + 5 \qquad$ Make x subject

$y - 5 = 3x$

$\frac{y-5}{3} = x \qquad x = \frac{y-5}{3}$

Ex 2 $\quad 3p + 2q = 5r \qquad$ Make q subject

$2q = 5r - 3p$

$q = \frac{5r - 3p}{2}$

Ex 3 $\quad P = 2(L + W) \qquad$ Make L subject

$P = 2L + 2W$

$P - 2W = 2L$

$\frac{P - 2W}{2} = L$

$L = \frac{P - 2W}{2}$

Exercise Make x the subject

1) $2y + 3x = 5$

$3x = 5 - 2y$

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

2) $px + 7 = y$

$px = y - 7$

$x = \frac{y - 7}{p}$

3) $y = \frac{x}{2} + 4$

$y - 4 = \frac{x}{2}$

$2(y - 4) = x$ ✓

$x = 2y - 8$ ✓