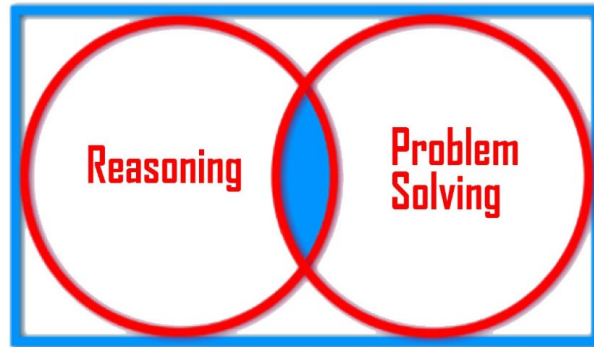


Bridging the Gap

GCSE to A – Level Transition



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Indices

(Negative, Fractional and Algebraic)

Answers

1

Simplify the following expressions as far as possible.

a) $7^{\frac{1}{2}} \times 7^{-2} \times 7^{\frac{2}{3}}$

b) $3^5 \div (5^3 - 44) + 2^4 \times 2^{-6}$

c) $\frac{t^5 \times t^7 \div t^{13}}{t^8 \div t^3}$

d) $3x^3 \times 4xy^5 \times x^3y^2$

e) $\frac{6a^5 \div a^7}{a^6 \times 3a^{-3}}$

Answers

a) $7^{-\frac{5}{6}}$

b) $\frac{13}{4} = 3\frac{1}{4}$

c) t^{-6}

d) $12x^7y^7$

e) $2a^{-5}$

2

a) Write the following numbers in index form.

I. $\frac{1}{6} = 6^{-1}$

II. $\frac{1}{5^4} = 5^{-4}$

III. $\frac{1}{\sqrt{7}} = 7^{-\frac{1}{2}}$

IV. $\frac{1}{\sqrt[3]{9}} = 9^{-\frac{1}{3}}$

b) Write the following as a fraction or root.

I. $6^{-3} = \frac{1}{6^3} = \frac{1}{216}$

II. $(3^2)^{-2} = \frac{1}{9^2} = \frac{1}{81}$

III. $(2^{-\frac{1}{2}})^3 = \left(\frac{1}{\sqrt{2}}\right)^3 = \frac{1}{2\sqrt{2}} = \frac{\sqrt{2}}{4}$

IV. $(x^{-\frac{1}{2}})^5 = \left(\frac{1}{\sqrt{x}}\right)^5 = \frac{1}{x^2\sqrt{x}} = \frac{\sqrt{x}}{x^3}$

3

a) Simplify the following fractional indices

I. $(16)^{\frac{5}{2}} = (\sqrt{16})^5 = 4^5 = 1024$

II. $(49)^{\frac{3}{2}} = 7^3 = 343$

III. $(8100)^{\frac{1}{2}} = 90$

IV. $-(9)^{\frac{5}{2}} = -(3^5) = -243$

b) Simplify the following indices.

I. $\left(\frac{36}{25}\right)^{\frac{1}{2}} = \frac{6}{5}$

II. $\left(\frac{343}{125}\right)^{\frac{2}{3}} = \frac{49}{25}$

III. $\left(\frac{1000}{216}\right)^{-\frac{1}{3}} = \frac{6}{10} = \frac{3}{5}$

IV. $\left(\frac{64}{27}\right)^{-\frac{2}{3}} = \frac{9}{16}$

4Work out the value of x in the following equations

a) $\frac{t^5 \times t^6}{t^x} = t^{-13}$ **$x = 24$**

b) $3^4 \times 3^8 = 3^x$ **$x = 12$**

c) $2^5 \div 2^x = 2^{-2} \times 2^7$ **$x = 0$**

d) $5^x \times 5^8 = 125$ **$x = -5$**

e) $3^{-2} \times 3 = 3^{-x}$ **$x = 1$**

5

Solve the following equations

a) $2^{3x} + 4 = 68$

b) $x^{\frac{1}{3}} = 125$

c) $(2^x)^{-5} = 128$

d) $\frac{1}{3^{2x}} = 27$

e) $6^{\frac{2}{3}x} = \frac{1}{216}$

Answer

a) $x = 2$

b) $x = 5$

c) $x = -\frac{7}{5}$

d) $-\frac{3}{2}$

e) $-\frac{9}{2}$