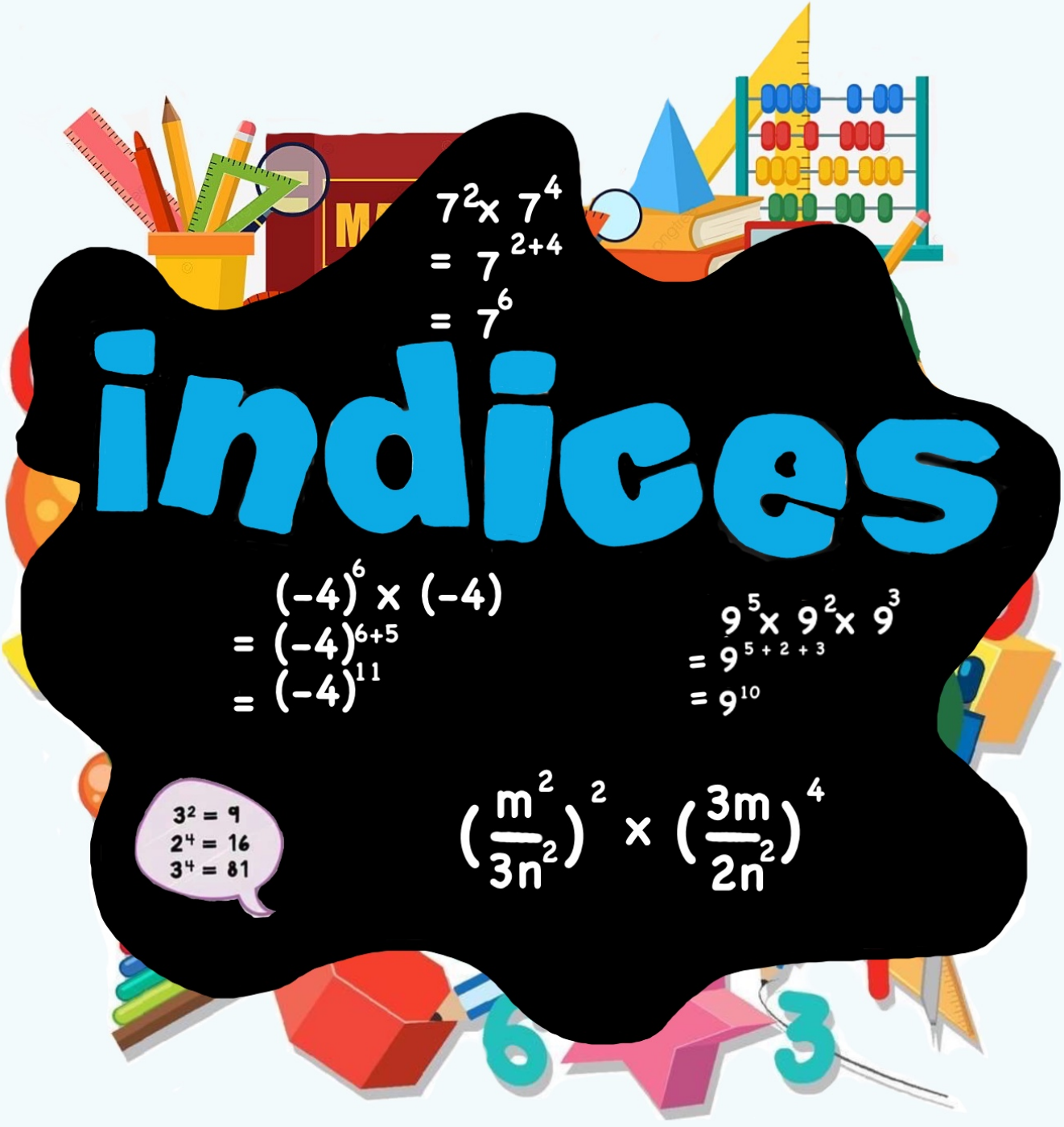
The Maths Society



Question 1

Work out.

$2^{-4} \times 2^5 = 2^{-4+5} = 2$ [1]

Question 2

Simplify.

(a) $(m^5)^2 = m^{10}$ [1]

(b) $4x^3y \times 5x^2y$ [2]

$20x^5y^2$

Question 3

Simplify.

$(x^2)^5$ [1]

x^{10}

Question 4

Simplify.

(a) $6w^0$ [1]

6

(b) $5x^3 - 3x^3$

$2x^3$

(c) $3y^6 \times 5y^{-2}$ [2]

$15y^4$

Question 5

(a) Write 5^{-3} as a fraction. [1]

$\frac{1}{5^3} = \frac{1}{125}$

(b) Write 0.004 56 in standard form. [1]

4.56×10^{-3}

Question 6

Simplify.

$36y^5 \div 4y^2$ [2]

$9y^3$

Question 7

Simplify $(16p^{16})^{\frac{1}{4}}$. [2]

$2p^4$

Question 8

Simplify.

(a) $x^3y^4 \times x^5y^3$ [2]

x^8y^8

(b) $(3p^2m^5)^3$ [2]

$27p^6m^{15}$

Question 9

Simplify.

$$\left(\frac{x^{64}}{16y^{16}}\right)^{\frac{1}{4}}$$

[3]

$$\frac{2e^{16}}{4y^4}$$

Question 10

Simplify.

$$6uw^{-3} \times 4uw^6$$

[2]

$$24u^2w^3$$

Question 11

$$81^x = 3$$

Find the value of x.

[1]

$$3^{4x} = 3$$

$$4x = 1$$

$$x = \frac{1}{4}$$

Question 12

Simplify.

(a) $12x^{12} \div 3x^3$

[2]

$$4x^9$$

(b) $(256y^{256})^{\frac{1}{8}}$

[2]

$$2y^{32}$$

Question 13

(a) Simplify

(i) x^0, [1]

1

(ii) $m^4 \times m^3$, [1]

m^7

(iii) $(8p^6)^{\frac{1}{3}}$. [2]

$2p^2$

(b) $243^x = 3^2$

Find the value of x. [2]

$3^{5x} = 3^2$

$5x = 2$

$x = \frac{2}{5}$

Question 1

(a) Simplify $x^8 \div x^2$. [1]

x^6

(b) Simplify $\left(\frac{x^6}{27}\right)^{\frac{1}{3}}$. [2]

$\frac{x^2}{3}$

Question 2

(a) $(2^{24})^{\frac{1}{2}} = p^4$

Find the value of p. [2]

$2^{12} = p^4$

$(2^3)^4 = p^4$

$p = 2^3 = 8$

(b) Simplify $\frac{q^2 + q^2}{q^{\frac{1}{4}} \times q^{\frac{1}{4}}}$. [3]

$\frac{2q^2}{q^{1/2}} = 2q^{1\frac{1}{2}}$ (or) $2q^{3/2}$

Question 3

Calculate $\frac{\sqrt[3]{16}}{1.3^2}$. [1]

$= \frac{(2^4)^{1/3}}{3^2} = \frac{2\sqrt[3]{2}}{9} = \frac{2}{9}\sqrt[3]{2}$

Question 4

(a) Simplify $(3125t^{125})^{\frac{1}{5}}$. [2]

$5t^{25}$

(b) Find the value of p when $3^p = \frac{1}{9}$. [1]

$p = -2$

(c) Find the value of w when $x^{72} \div x^w = x^8$. [1]

$72 - w = 8$

$w = 64$

Question 5

Simplify. [2]

$^2y^3 \times x^4y$

$2x^4y^4$

Question 6

(a) $3^x = \sqrt[4]{3^5}$

Find the value of x. [1]

$x = \frac{5}{4}$

(b) Simplify $(32y^{15})^{\frac{2}{5}}$. [2]

$(2^5y^{15})^{2/5} = 2^2y^6 = 4y^6$

Question 7

(a) Simplify $(64q^{-2})^{\frac{1}{2}}$. [2]

$8q^{-1} = \frac{8}{q}$

(b) $5^7 \div 5^9 = p^2$

Find p [2]

$\frac{1}{5}$

Question 8

Write $(27x^{12})^{\frac{1}{3}}$ in its simplest form. [2]

$3x^4$

Question 9

(a) $\left(\frac{3}{8}\right)^{\frac{3}{8}} \times \left(\frac{3}{8}\right)^{\frac{1}{8}} = p^q$

Find the value of p and the value of q. [2]

$p = \frac{3}{8}$, $q = \frac{1}{2}$

(b) $5^{-3} + 5^{-4} = k \times 5^{-4}$

Find the value of k. [2]

$5 + 1 = k$

$k = 6$

Question 10

Simplify $(256w^{256})^{\frac{1}{4}}$. [2]

$4w^{64}$

Question 11

Find the values of m and n.

(a) $2^{m} = 0.125$ [2]

$2^m = \frac{125}{1000}$

$2^m = \frac{1}{8} = \frac{1}{2^3} = 2^{-3}$

$m = -3$

(b) $2^{4n} \times 2^{2n} = 512$ [2]

$2^{6n} = 2^9$

$6n = 9$

$n = 9/2$

Question 1

Find the value of $\left(\frac{27}{8}\right)^{-\frac{4}{3}}$.

Give your answer as an exact fraction. [2]

$\left(\frac{8^3}{2^3}\right)^{-4/3} = \left(\frac{8}{2}\right)^{-4} = \left(\frac{2}{3}\right)^4 = \frac{16}{81}$

Question 2

(a) Find m when $4^m \times 4^2 = 4^{12}$. [1]

$4^{m+2} = 4^{12}$

$m+2 = 12$

$m = 10$

(b) Find p when $6^p \div 6^5 = \sqrt{6}$. [1]

$6^{p-5} = 6^{1/2}$

$p-5 = \frac{1}{2}$

$p = 5\frac{1}{2}$

Question 3

Simplify

(a) $32x^8 \div 8x^{32}$, [2]

$4x^{-24} = \frac{4}{x^{24}}$

(b) $\left(\frac{x^3}{64}\right)^{\frac{2}{3}}$. $= \frac{x^2}{4^2} = \frac{x^2}{16}$ [2]

Question 4

Simplify the following.

(a) $(3x^3)^3$ [2]

$27x^9$

(b) $(125x^6)^{\frac{2}{3}}$ [2]

$25x^4$

Question 5

Find the value of n in the following equations.

(a) $2^n = 1024$ [1]

$n = 10$

Question 6

Simplify

(a) $\left(\frac{16}{81}x^{16}\right)^{\frac{1}{2}}$, [2]

$\frac{4}{9}x^8$

Question 7

Simplify

(a) $\left(\frac{p^4}{16}\right)^{0.75}$, $\left(\frac{p^4}{2^4}\right)^{\frac{3}{4}} = \frac{p^3}{2^3} = \frac{p^3}{8}$ [2]

(b) $3^2q^{-3} \div 2^3q^{-2}$. [2]

$\frac{9}{8q}$

Question 8

Write $2^{8} \times 8^{2} \times 4^{-2}$ in the form 2^{n}. [2]

$2^8 \times (2^3)^2 \times (2^2)^{-2}$

$= 2^8 = 2^6 \times 2^{-4} = 2^6$

Question 9

Simplify $(27x^3)^{\frac{2}{3}}$. [2]

$(3^3 x^3)^{2/3} = 9x^2$

Question 10

(a) Simplify $(27x^6)^{\frac{1}{3}}$. [2]

$(3^3 x^6)^{1/3} = 3x^2$

(b) $(512)^{-\frac{2}{3}} = 2^p$. Find p. [2]

$(2^9)^{-2/3} = 2^p$

$p = -6$

Question 11

(a) $\sqrt{32} = 2^p$. Find the value of p. [2]

$2^{5/2} = 2^p$

$p = 5/2$

(b) $\sqrt[3]{8} = 2^q$. Find the value of q. [2]

$2^{-1} = 2^q$

$q = -1$

Question 12

Simplify $\frac{2}{3}p^{12} \times \frac{3}{4}p^{8}$. [2]

$\frac{1}{2}p^4$

Question 1

Simplify.

(a) $81^{\frac{3}{4}}$ [1]

$(8^4)^{3/4} = 27$

(b) $x^{\frac{2}{3}} \div x^{-\frac{4}{3}}$ [1]

$x^{2/3-(-4/3)} = x^2$

(c) $\left(\frac{8}{y^6}\right)^{-\frac{1}{3}}$ [2]

$\left(\frac{2^3}{y^6}\right)^{-1/3} = \frac{2^{-1}}{y^{-2}} = \frac{y^2}{2}$

Question 2

(a) $2^r = \frac{1}{16}$

Find the value of r. [1]

$2^r = 2^{-4}$

$r = -4$

(b) $3^t = \sqrt[5]{3}$

Find the value of t. [1]

$3^t = 3^{1/5}$

$t = \frac{1}{5}$

Question 3

Work out.

(a) $125^{\frac{2}{3}}$ [1]

$(5^3)^{2/3} = 25$

(b) $\left(\frac{1}{3}\right)^{-2}$ $3^2 = 9$ [1]

Question 4

(a) Simplify.

$(16x^{16})^{\frac{3}{4}}$

$(2^4x^{16})^{3/4} = 2^3x^{12} = 8x^{12}$

[2]

(b) $2p^{\frac{3}{2}} = 54$

$p^{3/2} = 27$

$(p^{1/2})^3 = 3^3$

$p^{1/2} = 3$

$p = 9$

Find the value of p.

[2]

Question 5

Simplify.

$\left(\frac{8}{a^{12}}\right)^{\frac{1}{3}}$

$\left(\frac{2^3}{a^{12}}\right)^{1/3} = \frac{2}{a^4}$

[2]

Question 6

Work out.

(a) $t^{24} \div t^4$

t^{20}

[1]

(b) $(x^5)^2$

x^{10}

[1]

(c) $(81m^8)^{\frac{3}{4}}$

$(8^4m^8)^{3/4} = 27m^6$

[2]

Question 7

Simplify. $(36x^{16})^{\frac{1}{2}}$

$6x^8$

[2]

Question 8

Simplify.

$\left(\frac{1}{2}x^{\frac{2}{3}}\right)^3$ [2]

$= \frac{1}{8}x^2$

Question 9

Simplify.

$(32x^{10})^{\frac{3}{5}}$ [2]

$8x^6$

Question 1

Find the value of

(a) $(\sqrt{5})^8$, [1]

625

(b) $\left(\frac{1}{27}\right)^{-\frac{2}{3}}$. [1]

$(27)^{2/3} = 9$

Question 2

(a) Find the value of

(i) $\left(\frac{1}{4}\right)^{0.5}$, [1]

$\frac{1}{2}$

(ii) $(-8)^{\frac{2}{3}}$. [1]

$((-2)^3)^{2/3} = 4$

(b) Use a calculator to find the decimal value of $\frac{\sqrt{29-3\times 32^{0.4}}}{3}$. [1]

1.374

Question 3

Simplify the following.

(a) $(4pq^2)^3$ [2]

$64p^3q^6$

(b) $(16x^8)^{-\frac{1}{4}}$ [2]

$(2^4x^8)^{-1/4} = (2x^2)^{-1} = \frac{1}{2x^2}$

Question 4

$a \times 10^7 + b \times 10^6 = c \times 10^6$

Find c in terms of a and b.
Give your answer in its simplest form. [2]

$10a + b = c$

Question 5

$3^x \times 9^4 = 3^n$

Find n in terms of x. [2]

$3^x \times (3^2)^4 = 3^n$

$x + 8 = n$

Question 6

Simplify $\frac{5}{8}x^{\frac{3}{2}} \div \frac{1}{2}x^{-\frac{5}{2}}$. [2]

$\frac{5}{4}x^4$

Question 7

Find the value of n in each of the following statements.

(a) $32^n = 1$ [1]

$n = 0$

(b) $32^n = 2$ [1]

$5n = 1$

$n = 1/5$

(c) $32^n = 8$ [1]

$5n = 3$

$n = \frac{3}{5}$

Question 8

Simplify

(a) $\left(\frac{x^{27}}{27}\right)^{\frac{2}{3}}$, $\frac{x^{18}}{9}$ [2]

(b) $\left(\frac{x^{-2}}{4}\right)^{-\frac{1}{2}}$. $2x$ [2]

Question 9

Find the **exact** value of

(a) 3^{-2}, $\frac{1}{9}$ [1]

(b) $\left(1\frac{7}{9}\right)^{\frac{1}{2}}$. $\frac{4}{3}$ [2]