Daily Practice 8.12.2017

Q1. Solve $\frac{x+8}{3} - \left(\frac{2x-3}{5}\right) = 2$

$5x+40-6x+9=30$
$-x+49=30$
$-x=-19$ $x=19$

Q2. Work out the answer to 5.6 x 4.5 x 10^{-3} and write your answer in scientific notation

0.0252
$= 2.52 \times 10^{-2}$

Q3. Calculate the area of a quarter circle with a diameter of 17cm

$\frac{\pi r^2}{4} = \frac{\pi \times 8.5^2}{4} = 56.7cm^2$ (1d.p.)

Q4. $(1\frac{2}{3} \times \frac{3}{4}) \div 2$

$\frac{5}{3} \times \frac{3}{4} \div 2$

$\frac{15}{12} \div \frac{2}{1} = \frac{15}{12} \times \frac{1}{2} = \frac{15}{24} = \frac{5}{8}$

Today we will be learning about surds.

Square Numbers

Keep your list of square numbers somewhere useful!

1, 4, 9, 16, 25, 36, 49, 64, 81,
100, 121, 144, 169, 196, 225, 256,
289, 324, 361, 400
20^2

Surds

A surd is a square root that cannot be reduced to a whole number.

E.g. $\sqrt{16} = 4$ is not a surd

$\sqrt{2} = 1.41421...$ is a surd

There are some rules for surds that help solve problems involving surds.

$\sqrt{a} \times \sqrt{b} = \sqrt{ab}$ and $\sqrt{ab} = \sqrt{a} \times \sqrt{b}$

Some rules when multiplying roots/surds

① $\sqrt{a} \times \sqrt{a} = a$ or $(\sqrt{a})^2 = a$

② $\sqrt{a} \times \sqrt{b} = \sqrt{ab}$

or

$\sqrt{ab} = \sqrt{a} \times \sqrt{b}$

Surds

Examples:

$\sqrt{a} \times \sqrt{b} = \sqrt{ab}$ and $\sqrt{ab} = \sqrt{a} \times \sqrt{b}$

1. $\sqrt{3} \times \sqrt{4}$ 2. $\sqrt{36}$ 3. $\sqrt{42}$

Surds

Simplify :

a. $\sqrt{2}\times\sqrt{2}$	b. $\sqrt{3}\times\sqrt{3}$	c. $\sqrt{11}\times\sqrt{11}$	d. $\sqrt{a}\times\sqrt{a}$
e. $\sqrt{5}\times\sqrt{5}$	f. $\sqrt{c}\times\sqrt{c}$	g. $\sqrt{6}\times\sqrt{6}$	h. $\sqrt{k}\times\sqrt{k}$
i. $\sqrt{2}\times\sqrt{8}$	j. $\sqrt{12}\times\sqrt{3}$	k. $\sqrt{5}\times\sqrt{20}$	l. $\sqrt{2}\times\sqrt{32}$
m. $\sqrt{a}\times\sqrt{b}$	n. $\sqrt{10}\times\sqrt{x}$	o. $\sqrt{p}\times\sqrt{q}$	p. $\sqrt{k}\times\sqrt{6}$
q. $\sqrt{2}\times\sqrt{10}$	r. $\sqrt{24}\times\sqrt{3}$	s. $\sqrt{5}\times\sqrt{10}$	t. $\sqrt{6}\times\sqrt{12}$
u. $\sqrt{6}\times\sqrt{3}$	v. $\sqrt{20}\times\sqrt{3}$	w. $\sqrt{4}\times\sqrt{8}$	x. $\sqrt{15}\times\sqrt{10}$

Surds

Simplify :

a. $\sqrt{2}\times\sqrt{2}=2$	b. $\sqrt{3}\times\sqrt{3}=3$	c. $\sqrt{11}\times\sqrt{11}=11$	d. $\sqrt{a}\times\sqrt{a}=a$
e. $\sqrt{5}\times\sqrt{5}=5$	f. $\sqrt{c}\times\sqrt{c}=c$	g. $\sqrt{6}\times\sqrt{6}=6$	h. $\sqrt{k}\times\sqrt{k}=k$
i. $\sqrt{2}\times\sqrt{8}=\sqrt{16}=4$	j. $\sqrt{12}\times\sqrt{3}=\sqrt{36}=6$	k. $\sqrt{5}\times\sqrt{20}=10$	l. $\sqrt{2}\times\sqrt{32}=8$
m. $\sqrt{a}\times\sqrt{b}=\sqrt{ab}$	n. $\sqrt{10}\times\sqrt{x}=\sqrt{10x}$	o. $\sqrt{p}\times\sqrt{q}=\sqrt{pq}$	p. $\sqrt{k}\times\sqrt{6}=\sqrt{6k}$
q. $\sqrt{2}\times\sqrt{10}=\sqrt{20}$	r. $\sqrt{24}\times\sqrt{3}=\sqrt{72}$	s. $\sqrt{5}\times\sqrt{10}=\sqrt{50}$	t. $\sqrt{6}\times\sqrt{12}=\sqrt{72}$
u. $\sqrt{6}\times\sqrt{3}=\sqrt{18}$	v. $\sqrt{20}\times\sqrt{3}=\sqrt{60}$	w. $\sqrt{4}\times\sqrt{8}=\sqrt{32}$	x. $\sqrt{15}\times\sqrt{10}=\sqrt{150}$

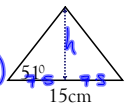
Daily Practice

11.12.2017

Q1. Factorise $3x^2y - 15xy^2$

$3xy(x-5y)$

Q2. Calculate the area of the isosceles triangle shown



$A=\frac{1}{2}(b\times h)$

$=\frac{1}{2}(15\times 9.26)$

$=69.5\text{cm}^2$ (1dp)

$\tan 51° = \frac{h}{7.5}$

$7.5\times\tan 51° = h$

$h = 9.26\text{cm}$ (2dp)

Q3. Solve the inequation $\frac{7k-1}{2}-\frac{3k}{3}\le 7+k$

$21k-3-6k\le 42+6k$

$15k-3\le 42+6k$

$9k\le 45$

$k\le 5$

Q4. Simplify $k^2(3k^{-4}+k^2)$

$=3k^{-2}+k^4$

$=\frac{3}{k^2}+k^4$

Today we will be continuing to practise simplifying surds.

Simplifying Surds

$\sqrt{a}\times\sqrt{b}=\sqrt{ab}$ and $\sqrt{ab}=\sqrt{a}\times\sqrt{b}$

Surds can also be simplified using these rules. (Square numbers will help here)

Examples: Simplify the following

highest square number that goes into 32

(a) $\sqrt{32}=\sqrt{16}\times\sqrt{2}$

$4\sqrt{2}$

(b) $\sqrt{72}=\sqrt{36}\times\sqrt{2}$

$=6\sqrt{2}$

(c) $\sqrt{108}=\sqrt{36}\times\sqrt{3}$

$=6\sqrt{3}$

(d) $3\sqrt{50}$

$3\times\sqrt{25}\times\sqrt{2}$

$3\times5\times\sqrt{2}=15\sqrt{2}$

Simplifying Surds

Simplify :

a. $\sqrt{20}$	b. $\sqrt{12}$	c. $\sqrt{8}$	d. $\sqrt{90}$	e. $\sqrt{18}$	f. $\sqrt{28}$
g. $\sqrt{45}$	h. $\sqrt{24}$	i. $\sqrt{80}$	j. $\sqrt{72}$	k. $\sqrt{300}$	l. $\sqrt{32}$
m. $\sqrt{160}$	n. $\sqrt{27}$	o. $\sqrt{150}$	p. $\sqrt{44}$	q. $\sqrt{63}$	r. $\sqrt{50}$
s. $\sqrt{175}$	t. $\sqrt{60}$	u. $\sqrt{1200}$	v. $\sqrt{224}$	w. $10\sqrt{48}$	x. $2\sqrt{108}$

Simplifying Surds

Simplify :

a. $\sqrt{20}$ b. $\sqrt{12}$ c. $\sqrt{8}$ d. $\sqrt{90}$ e. $\sqrt{18}$ f. $\sqrt{28}$
g. $\sqrt{45}$ h. $\sqrt{24}$ i. $\sqrt{80}$ j. $\sqrt{72}$ k. $\sqrt{300}$ l. $\sqrt{32}$
m. $\sqrt{160}$ n. $\sqrt{27}$ o. $\sqrt{150}$ p. $\sqrt{44}$ q. $\sqrt{63}$ r. $\sqrt{50}$
s. $\sqrt{175}$ t. $\sqrt{60}$ u. $\sqrt{1200}$ v. $\sqrt{224}$ w. $10\sqrt{48}$ x. $2\sqrt{108}$

$= 5\sqrt{7}$ $2\sqrt{15}$ $10\sqrt{12}$ $20\sqrt{3}$ $4\sqrt{14}$ $40\sqrt{3}$ $12\sqrt{3}$

Today we will be learning to add and subtract surds.

Simplifying Surds

Q1.
Express each of the following in its simplest form.

a. $4\sqrt{3} + 5\sqrt{3}$ b. $8\sqrt{6} - 2\sqrt{6}$ c. $\sqrt{2} + 2\sqrt{2}$ d. $3\sqrt{7} - 9\sqrt{7}$
e. $5\sqrt{10} - 5\sqrt{10}$ f. $\sqrt{5} + 5\sqrt{5} - 3\sqrt{5}$ g. $2\sqrt{3} + \sqrt{3} - 5\sqrt{3}$ h. $5\sqrt{11} + 7\sqrt{11} - \sqrt{11}$

Q2.
Express each of the following in its simplest form.

a. $\sqrt{12} + \sqrt{27}$ b. $\sqrt{32} - \sqrt{8}$ c. $\sqrt{72} - \sqrt{50}$ d. $\sqrt{2} + \sqrt{98}$
e. $\sqrt{80} + \sqrt{20}$ f. $\sqrt{24} + \sqrt{54}$ g. $\sqrt{180} - \sqrt{45}$ h. $\sqrt{1000} - \sqrt{90}$

Q3. Multiply out the brackets and simplify, where possible.

a. $\sqrt{3}(\sqrt{2} + 1)$ b. $\sqrt{2}(\sqrt{8} + \sqrt{2})$ c. $\sqrt{3}(\sqrt{2} + \sqrt{6})$

Daily Practice 13.12.2017

Q1. Find the value of a house that was worth £58 000 and appreciated in value by 7.1%

$58000 \times 1.071 = £62118$

Q2. Solve $\frac{8-3x}{4} = -4$ $\times 4$ $\times 4$

$8 - 3x = -16$
$-3x = -24$
$x = 8$

Q3. $(\frac{2}{3} - \frac{3}{4}) \div \frac{4}{5}$

$\frac{8}{12} - \frac{9}{12}$
$-\frac{1}{12} \div \frac{4}{5}$
$-\frac{1}{12} \times \frac{5}{4} = -\frac{5}{48}$

Q4. Simplify $\sqrt{300}$ $= \sqrt{100}\sqrt{3} = 10\sqrt{3}$

Simplifying Surds

'Like' surds can be collected, similar to algebraic terms.

Examples:

(a) $2\sqrt{3} + 4\sqrt{3} - \sqrt{3}$
$= 5\sqrt{3}$

(b) $5\sqrt{2} + 8\sqrt{2}$
$= 13\sqrt{2}$

(c) $\sqrt{12} + \sqrt{27}$
$= \sqrt{4}\sqrt{3} + \sqrt{9}\sqrt{3}$
$= 2\sqrt{3} + 3\sqrt{3}$
$= 5\sqrt{3}$

(d) $9\sqrt{20} + \sqrt{500}$
$= 9\sqrt{4}\sqrt{5} + \sqrt{100}\sqrt{5}$
$= 18\sqrt{5} + 10\sqrt{5}$
$= 28\sqrt{5}$

Daily Practice 14.12.2017

Q1. Make a rough sketch of the graph $y = (x - 3)^2$

Q2. Multiply out and simplify $3(2x - 1) - 4(x + 8) + 2x$

$6x - 3 - 4x - 32 + 2x$
$4x - 35$

(3, 0)

Q3. Write 71800000 in scientific notation

7.18×10^7

Q4. Simplify $\sqrt{720}$

$\sqrt{144}\sqrt{5}$
$= 12\sqrt{5}$

Q5. 20% of £40 - £3.86

$£8 - £3.86 = £4.14$

Today we will be continuing to learn how to simplify surds.

Homework online due Wednesday 20.12.2017

Simplifying Surds

Trickier Examples: Multiply out and simplify

(a) $\sqrt{3}(\sqrt{5} + \sqrt{3})$

$\sqrt{15} + \sqrt{9}$

$\sqrt{15} + 3$

(b) $\sqrt{7}(\sqrt{8} + 2)$

$\sqrt{56} + 2\sqrt{7}$

$\sqrt{4}\sqrt{14} + 2\sqrt{7}$

$2\sqrt{14} + 2\sqrt{7}$

Expand and simplify:

(a)	$\sqrt{2}(1 - \sqrt{2})$	**(b)**	$\sqrt{3}(\sqrt{3} + 1)$	**(c)**	$\sqrt{5}(\sqrt{5} - 1)$
(d)	$\sqrt{2}(5 + \sqrt{2})$	**(e)**	$\sqrt{2}(3 + \sqrt{6})$	**(f)**	$2\sqrt{3}(\sqrt{8} + 1)$
(g)	$\sqrt{3}(\sqrt{6} - 2\sqrt{8})$	**(h)**	$\sqrt{5}(\sqrt{5} + 2)$	**(i)**	$4\sqrt{6}(2\sqrt{6} - \sqrt{8})$
(j)	$\sqrt{8}(\sqrt{2} + 4)$	**(k)**	$2\sqrt{12}(\sqrt{3} + \sqrt{6})$	**(l)**	$\sqrt{5}(\sqrt{200} + \sqrt{50})$
(m)	$\sqrt{3}(\sqrt{2} + 1)$	**(n)**	$\sqrt{2}(\sqrt{8} + \sqrt{2})$	**(o)**	$\sqrt{3}(\sqrt{2} + \sqrt{6})$
		(p)	$\sqrt{5}(3 - \sqrt{5})$		

Daily Practice 15.12.2017

Q1. Solve $2(3 - 2m) = 2(6 - m)$

$6 - 4m = 12 - 2m$

$-4m = 6 - 2m$

$-2m = 6$

$m = -3$

Q2. Solve the inequality $8 + 2y > 3(4 - y)$

$8 + 2y > 12 - 3y$

$8 + 5y > 12$

$5y > 4$

$y > \frac{4}{5}$

Q3. Calculate the current value of a house that was worth £189 000 and appreciated by 7.6% in its first year and 5.2% in its second

$189000 \times 1.076 = 203364$

$203364 \times 1.052 = £213\,938.93$

Q4. Simplify $\sqrt{50} - \sqrt{32}$

$= \sqrt{25}\sqrt{2} - \sqrt{16}\sqrt{2} = 5\sqrt{2} - 4\sqrt{2} = \sqrt{2}$

Expand and simplify:

(a)	$\sqrt{2}(1 - \sqrt{2})$ $\sqrt{2} - 2$	**(b)**	$\sqrt{3}(\sqrt{3} + 1)$ $3 + \sqrt{3}$	**(c)**	$\sqrt{5}(\sqrt{5} - 1)$ $5 - \sqrt{5}$
(d)	$\sqrt{2}(5 + \sqrt{2})$ $5\sqrt{2} + 2$	**(e)**	$\sqrt{2}(3 + \sqrt{6})$ $3\sqrt{2} + 2\sqrt{3}$	**(f)**	$2\sqrt{3}(\sqrt{8} + 1)$ $4\sqrt{6} + 2\sqrt{3}$
(g)	$\sqrt{3}(\sqrt{6} - 2\sqrt{8})$ $3\sqrt{2} - 4\sqrt{6}$	**(h)**	$\sqrt{5}(\sqrt{5} + 2)$ $5 + 2\sqrt{5}$	**(i)**	$4\sqrt{6}(2\sqrt{6} - \sqrt{8})$ $48 - 16\sqrt{3}$
(j)	$\sqrt{8}(\sqrt{2} + 4)$ $4 + 8\sqrt{2}$	**(k)**	$2\sqrt{12}(\sqrt{3} + \sqrt{6})$ $12 + 12\sqrt{2}$	**(l)**	$\sqrt{5}(\sqrt{200} + \sqrt{50})$ $10\sqrt{10} + 5\sqrt{10}$
(m)	$\sqrt{3}(\sqrt{2} + 1)$ $\sqrt{6} + \sqrt{3}$	**(n)**	$\sqrt{2}(\sqrt{8} + \sqrt{2})$ $4 + 2 = 6$	**(o)**	$\sqrt{3}(\sqrt{2} + \sqrt{6})$ $\sqrt{6} + \sqrt{18}$ $\sqrt{6} + 3\sqrt{2}$
		(p)	$\sqrt{5}(3 - \sqrt{5})$ $3\sqrt{5} - 5$		

$15\sqrt{10}$

$\sqrt{2} \times \sqrt{12} = \sqrt{24}$

Today we will be learning how to divide surds.

$= \frac{\sqrt{24}}{\sqrt{12}} = \sqrt{2}$ $\sqrt{\frac{24}{12}} = \sqrt{2}$

Dividing Surds

When dividing two surds, they can be written as a division sum under one square root.

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

$\frac{\sqrt{24}}{\sqrt{12}} = \frac{\sqrt{12}\times\sqrt{2}}{\sqrt{12}} = \sqrt{2}$

$\frac{\sqrt{25}\sqrt{2}}{\sqrt{9}\sqrt{2}} = \frac{5\sqrt{2}}{3\sqrt{2}} = \frac{5}{3}$

Examples: Simplify

(a) $\frac{\sqrt{30}}{\sqrt{3}} = \sqrt{10}$

(b) $\sqrt{\frac{9}{4}} = \frac{\sqrt{9}}{\sqrt{4}} = \frac{3}{2}$

(c) $\frac{\sqrt{50}}{\sqrt{18}} = \sqrt{\frac{50}{18}} = \sqrt{\frac{25}{9}} = \frac{\sqrt{25}}{\sqrt{9}} = \frac{5}{3}$

Dividing Surds

Simplify:

(a) $\frac{\sqrt{8}}{\sqrt{2}}$ (b) $\frac{\sqrt{27}}{\sqrt{12}}$ (c) $\frac{\sqrt{2}}{\sqrt{32}}$ (d) $\frac{\sqrt{3}}{\sqrt{27}}$

(e) $\frac{\sqrt{20}}{\sqrt{5}}$ (f) $\frac{\sqrt{12}}{\sqrt{48}}$ (g) $\frac{\sqrt{54}}{\sqrt{24}}$ (h) $\frac{\sqrt{175}}{\sqrt{63}}$

(i) $\frac{\sqrt{18}}{\sqrt{72}}$ (j) $\frac{\sqrt{6}}{\sqrt{54}}$ (k) $\frac{\sqrt{288}}{\sqrt{8}}$ (l) $\frac{\sqrt{1000}}{\sqrt{90}}$

(m) $\frac{\sqrt{48}}{\sqrt{6}}$ (n) $\frac{\sqrt{3}}{\sqrt{24}}$ (o) $\frac{\sqrt{98}}{\sqrt{7}}$ (p) $\frac{\sqrt{50}}{\sqrt{250}}$

Pegasys

Dividing Surds

Simplify:

(a) $\frac{\sqrt{8}}{\sqrt{2}} = 2$ (b) $\frac{\sqrt{27}}{\sqrt{12}} = \frac{3}{2}$ (c) $\frac{\sqrt{2}}{\sqrt{32}} = \frac{1}{4}$ (d) $\frac{\sqrt{3}}{\sqrt{27}} = \frac{\sqrt{3}}{\sqrt{9}\sqrt{3}} = \frac{1}{3}$

(e) $\frac{\sqrt{20}}{\sqrt{5}} = 2$ (f) $\frac{\sqrt{12}}{\sqrt{48}} = \frac{1}{2}$ (g) $\frac{\sqrt{54}}{\sqrt{24}} = \frac{3}{2}$ (h) $\frac{\sqrt{175}}{\sqrt{63}} = \frac{5}{3}$

(i) $\frac{\sqrt{18}}{\sqrt{72}} = \frac{1}{2}$ (j) $\frac{\sqrt{6}}{\sqrt{54}} = \frac{1}{3}$ (k) $\frac{\sqrt{288}}{\sqrt{8}} = 6$ (l) $\frac{\sqrt{1000}}{\sqrt{90}} = \frac{10}{3}$

(m) $\frac{\sqrt{48}}{\sqrt{6}} = \sqrt{8} = 2\sqrt{2}$ (n) $\frac{\sqrt{3}}{\sqrt{24}} = \frac{1}{2\sqrt{2}}$ (o) $\frac{\sqrt{98}}{\sqrt{7}} = \sqrt{14}$ (p) $\frac{\sqrt{50}}{\sqrt{250}} = \sqrt{\frac{1}{5}} = \frac{1}{\sqrt{5}}$

$\frac{\sqrt{144}\sqrt{2}}{\sqrt{4}\sqrt{2}} = \sqrt{36} = 6$

$\frac{\sqrt{49}\sqrt{2}}{\sqrt{7}} = \frac{\sqrt{7}\sqrt{7}\sqrt{2}}{\sqrt{7}} = \sqrt{14}$

Pegasys

Today we will be learning how to rationalise the denominator of a surd.

Daily Practice 18.12.2017

Q1. Multiply out and simplify $3(2x - 1) - 4(x + 3) + 3x^2$

$6x - 3 - 4x - 12 + 3x^2$

$2x - 15 + 3x^2$

Q2. Simplify $x^2(x^{-3} + 2x)$

$x^{-1} + 2x^3$

Q3. Calculate the median and mean of -1, 3, 4, 7, 6, 11

-1, 3, 4, 6, 7, 11

Median: $\frac{4+6}{2} = 5$ Mean: $\frac{30}{6} = 5$

Q4. $1\frac{2}{5} - \frac{3}{4} = \frac{7}{5} - \frac{3}{4} = \frac{28}{20} - \frac{15}{20} = \frac{13}{20}$

Rationalising the denominator

We want the denominator to be a whole number.

Multiply both numerator and denominator by the denominator to get an equivalent fraction.

$$\frac{a}{\sqrt{b}} \times \frac{\sqrt{b}}{\sqrt{b}} = \frac{a\sqrt{b}}{b}$$

Rationalising the denominator

Examples: Rationalise the denominator for each

(a) $\frac{2}{\sqrt{3}} \times \frac{\sqrt{3}}{\sqrt{3}} = \frac{2\sqrt{3}}{3}$

(b) $\frac{6}{\sqrt{15}} \times \frac{\sqrt{15}}{\sqrt{15}} = \frac{6\sqrt{15}}{15} \div 3 = \frac{2\sqrt{15}}{5}$

(c) $\frac{1+\sqrt{2}}{\sqrt{2}} \times \frac{\sqrt{2}}{\sqrt{2}} = \frac{\sqrt{2}(1+\sqrt{2})}{2} = \frac{\sqrt{2}+2}{2}$

(d) $\frac{30}{\sqrt{50}} \times \frac{\sqrt{50}}{\sqrt{50}} = \frac{30\sqrt{50}}{50} = \frac{3\sqrt{50}}{5} = \frac{3\sqrt{25}\sqrt{2}}{5} = \frac{15\sqrt{2}}{5} = 3\sqrt{2}$

Daily Practice 20.12.2017

Q1. Simplify $\frac{3k^2 \times 5k \times 2k^{-5}}{6k}$

Q2. Solve $\frac{2x+4}{5} = 20$

Q3. Write 0.0000876 in scientific notation

Q4. Draw a rough sketch of the function $y = x^2 + 4$

Q5. Simplify $\sqrt{48} + 3\sqrt{3}$

1) $\frac{2}{\sqrt{3}}$ 2) $\frac{5}{\sqrt{8}}$ 3) $\frac{1+\sqrt{3}}{\sqrt{3}}$ 4) $\frac{5-\sqrt{2}}{\sqrt{2}}$ 5) $\frac{\sqrt{7}}{\sqrt{3}}$ 6) $\frac{2\sqrt{2}}{\sqrt{3}}$ 7) $\frac{5\sqrt{5}}{\sqrt{2}}$ 8) $\frac{\sqrt{2}+\sqrt{3}}{\sqrt{2}}$ 9) $\frac{8}{\sqrt{11}}$ 10) $\frac{12}{\sqrt{13}}$

Express each of the following with a ***rational denominator*** and simplify where possible:

(a) $\frac{1}{2\sqrt{5}}$ (b) $\frac{4}{5\sqrt{2}}$ (c) $\frac{3}{3\sqrt{2}}$ (d) $\frac{12}{5\sqrt{6}}$

(e) $\frac{8}{3\sqrt{2}}$ (f) $\frac{20}{7\sqrt{5}}$ (g) $\frac{50}{3\sqrt{10}}$ (h) $\frac{10}{3\sqrt{2}}$

Express each of the following in its simplest form with a rational denominator.

(a) $\frac{\sqrt{3}}{\sqrt{2}}$ (b) $\frac{\sqrt{2}}{\sqrt{5}}$ (c) $\frac{\sqrt{8}}{\sqrt{2}}$ (d) $\frac{\sqrt{18}}{\sqrt{3}}$

(e) $\frac{\sqrt{5}}{\sqrt{20}}$ (f) $\frac{\sqrt{2}}{\sqrt{12}}$ (g) $\frac{\sqrt{15}}{\sqrt{5}}$ (h) $\frac{\sqrt{8}}{\sqrt{6}}$

(i) $\frac{\sqrt{5}}{\sqrt{2}}$ (j) $\frac{\sqrt{11}}{\sqrt{2}}$ (k) $\frac{\sqrt{7}}{\sqrt{3}}$ (l) $\frac{\sqrt{13}}{\sqrt{5}}$

(m) $\frac{\sqrt{8}}{3\sqrt{2}}$ (n) $\frac{2\sqrt{3}}{3\sqrt{2}}$ (o) $\frac{5\sqrt{3}}{3\sqrt{5}}$ (p) $\frac{4\sqrt{5}}{5\sqrt{3}}$

- Express each of the following with a ***rational denominator*** and simplify where possible:

(a) $\frac{1}{2\sqrt{5}} = \frac{\sqrt{5}}{10}$ (b) $\frac{4}{5\sqrt{2}} = \frac{2\sqrt{2}}{5}$ (c) $\frac{3}{3\sqrt{2}} = \frac{\sqrt{2}}{2}$ (d) $\frac{12}{5\sqrt{6}} = \frac{2\sqrt{6}}{5}$

(e) $\frac{8}{3\sqrt{2}} = \frac{4\sqrt{2}}{3}$ (f) $\frac{20}{7\sqrt{5}} = \frac{4\sqrt{5}}{7}$ (g) $\frac{50}{3\sqrt{10}} = \frac{5\sqrt{10}}{3}$ (h) $\frac{10}{3\sqrt{2}} = \frac{5\sqrt{2}}{3}$

Express each of the following in its simplest form with a rational denominator.

(a) $\frac{\sqrt{3}}{\sqrt{2}} = \frac{\sqrt{6}}{2}$ (b) $\frac{\sqrt{2}}{\sqrt{5}} = \frac{\sqrt{10}}{5}$ (c) $\frac{\sqrt{8}}{\sqrt{2}} = 2$ (d) $\frac{\sqrt{18}}{\sqrt{3}} = \sqrt{6}$

(e) $\frac{\sqrt{5}}{\sqrt{20}} = \frac{1}{2}$ (f) $\frac{\sqrt{2}}{\sqrt{12}} = \frac{\sqrt{24}}{12} = \frac{2\sqrt{6}}{12} = \frac{\sqrt{6}}{6}$ (g) $\frac{\sqrt{15}}{\sqrt{5}} = \sqrt{3}$ (h) $\frac{\sqrt{8}}{\sqrt{6}} = \frac{\sqrt{48}}{6} = \frac{4\sqrt{3}}{6} = \frac{2\sqrt{3}}{3}$

(i) $\frac{\sqrt{5}}{\sqrt{2}} = \frac{\sqrt{10}}{2}$ (j) $\frac{\sqrt{11}}{\sqrt{2}} \rightarrow \frac{\sqrt{22}}{2}$ (k) $\frac{\sqrt{7}}{\sqrt{3}} = \frac{\sqrt{21}}{3}$ (l) $\frac{\sqrt{13}}{\sqrt{5}} = \frac{\sqrt{65}}{5}$

(m) $\frac{\sqrt{8}}{3\sqrt{2}} = \frac{4}{6} = \frac{2}{3}$ (n) $\frac{2\sqrt{3}}{3\sqrt{2}} = \frac{2\sqrt{6}}{6} = \frac{\sqrt{6}}{3}$ (o) $\frac{5\sqrt{3}}{3\sqrt{5}} = \frac{5\sqrt{15}}{15} = \frac{\sqrt{15}}{3}$ (p) $\frac{4\sqrt{5}}{5\sqrt{3}} = \frac{4\sqrt{15}}{15}$

Today we will be learning how to interpret fractional indices.

Fractional Indices

If a power is a fraction, the denominator is always the root and the numerator is always the power.

power → m, n ← root

$$a^{\frac{m}{n}} = \sqrt[n]{a^m}$$

When the root is 2, this just means square root.

Examples:

(i) $z^{\frac{2}{3}} = (\sqrt[3]{z})^2$ (ii) $a^{\frac{1}{2}} = \sqrt{a}$ (iii) $a^{\frac{1}{3}} = \sqrt[3]{a}$ (iv) $a^{\frac{5}{7}} = (\sqrt[7]{a})^5$

(v) $8^{\frac{3}{2}} = (\sqrt{8})^3 = 9^3 = 729$ (vi) $4^{-\frac{1}{2}} = \frac{1}{4^{\frac{1}{2}}} = \frac{1}{\sqrt{4}} = \frac{1}{2}$ (vii) $8^{-\frac{2}{3}}$

Today we will be marking the homework!

Daily Practice 21.12.17

20 Questions Mental Maths

1. $\sqrt{3} \times 2\sqrt{5} = 2\sqrt{15}$ ✓

2. $\sqrt{2}(1+\sqrt{3}) = \sqrt{2}+\sqrt{6}$ ✓

3. $\sqrt{250} = \sqrt{25}\sqrt{10} = 5\sqrt{10}$ ✓

4. $2\sqrt{3} + 5\sqrt{3} - \sqrt{3}$
$= 6\sqrt{3}$ ✓

5. $\sqrt{50} + 3\sqrt{2} - \sqrt{32}$
$\sqrt{25}\sqrt{2} + 3\sqrt{2} - \sqrt{16}\sqrt{2}$
$5\sqrt{2} + 3\sqrt{2} - 4\sqrt{2}$
$= 4\sqrt{2}$ ✓

6. $\frac{\sqrt{25}}{\sqrt{4}} = \frac{5}{2}$ ✓

7. $\sqrt{\frac{300}{75}} = \sqrt{4} = 2$ ✓

8. Write with a rational denominator $\frac{2+\sqrt{3}}{\sqrt{3}}$

$\frac{\sqrt{3}(2+\sqrt{3})}{3}$ ✓ $= \frac{2\sqrt{3}+3}{3}$ ✓

9. Evaluate

(i) $27^{\frac{2}{3}}$

$(\sqrt[3]{27})^2$ ✓

$3^2 = 9$ ✓

(ii) $36^{\frac{3}{2}}$

$(\sqrt{36})^3$ ✓

$6^3 = 216$ ✓

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Fractional Indices

Evaluate the following:

(a) $16^{\frac{1}{4}}$

(b) $4^{\frac{1}{2}}$

(c) $36^{\frac{1}{2}}$

(d) $8^{\frac{1}{3}}$

(e) $9^{\frac{1}{2}}$

(f) $100^{\frac{3}{2}}$

(g) $144^{\frac{5}{2}}$

(h) $81^{\frac{2}{3}}$

(i) $27^{\frac{1}{3}}$

(j) $49^{\frac{3}{2}}$

Write these with roots and powers

(i) $x^{\frac{1}{2}}$

(ii) $a^{\frac{5}{2}}$

(iii) $b^{\frac{7}{4}}$

(iv) $z^{-\frac{5}{2}}$

(v) $q^{\frac{5}{3}}$

(vi) $6m^{\frac{2}{5}}$

(vii) $3t^{-\frac{1}{2}}$

Fractional Indices

Rewrite the following so that they have a fractional index

1. $\sqrt{x}$
2. $\sqrt[3]{y}$
3. $\sqrt[4]{z}$
4. $(\sqrt{x})^3$
5. $(\sqrt{x})^4$
6. $\frac{1}{\sqrt{x}}$
7. $(\sqrt[3]{y})^7$
8. $(\sqrt[4]{z})^3$
9. $(\sqrt[5]{w})^3$