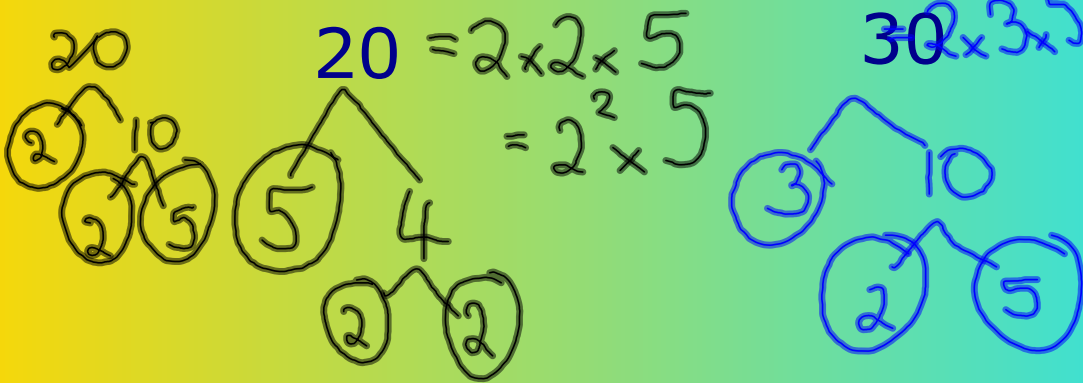


Expressing numbers as the product of their prime factors

Make a list of the first 10 prime numbers:

2, 3, 5, 7, 11, 13, 17, 19,
23, 29,

Factor trees:



$$12 = 2^2 \times 3$$

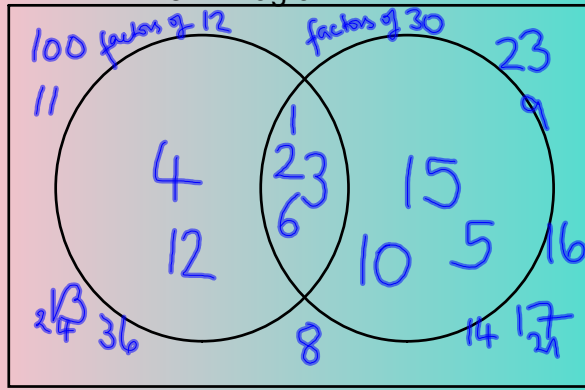
$$18 = 3^2 \times 2$$

$$2 \times 3 \times 3$$

$$40 = 2^3 \times 5$$

$$50 = 2 \times 5^2$$

A Venn Diagram



hcf



Express 42 and 60 as the product of their primes.

$$42 = 2 \times 3 \times 7 \qquad 60 = 2 \times 2 \times 3 \times 5$$

$$\text{HCF} = 2 \times 3 = 6$$

Find all the common factors of 42 and 60.
 Find the highest common factor (HCF) of 42 and 60.

Express 630 and 660 as the product of their primes.

$630 = 2 \times 3 \times 3 \times 5 \times 7$

$660 = 2 \times 2 \times 3 \times 5 \times 11$

$\text{HCF} = 2 \times 3 \times 5 = 30$

Find all the common factors of 630 and 660.
 Find the highest common factor (HCF) of 630 and 660.

Find the hcf of these numbers

$$\begin{array}{l} \underline{2 \times 2 \times 3 \times 5 \times 11} \\ \underline{2 \times 5 \times 11 \times 13} \\ = 2 \times 5 \times 11 \\ = 110 \end{array}$$

$$\begin{array}{l} \underline{2 \times 2 \times 3 \times 3 \times 5} \\ \underline{2 \times 3 \times 3 \times 3 \times 7} \\ = \underline{2} \times \underline{3} \times \underline{3} \times \underline{3} \\ = 18 \end{array}$$

$$5 \times 7 \times 7 \times 7 \times 11$$

$$= 18$$

$$3 \times 7 \times 11 \times 11$$

$$\text{HCF} = 77$$

Highest Common Factor

Find the hcf of

$$33,6 \quad 3 \quad 27,18 \quad 9$$

$$10,12 \quad 2 \quad 18,90 \quad 18$$

Find the prime factorisation of

10 and 35.

Find the HCF.

$$\begin{aligned} 10 &= 2 \times 5 \\ 35 &= 5 \times 7 \end{aligned} \quad \text{HCF} = 5$$

a) Find the prime factorisation of 100 and 140.

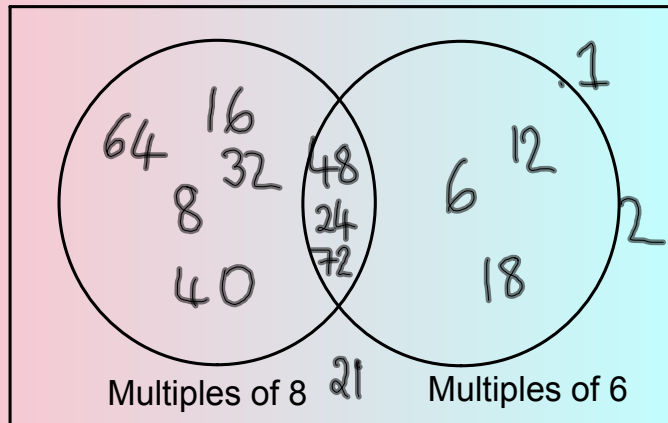
b) Find the HCF.

$$\begin{aligned} 100 &= \underline{2} \times \underline{2} \times \underline{5} \times \underline{5} \\ 140 &= \underline{2} \times \underline{2} \times \underline{5} \times \underline{7} \end{aligned}$$
$$\begin{aligned} \text{HCF} &= \underline{2} \times \underline{2} \times \underline{5} \\ &= 20 \end{aligned}$$

Find the prime factorisation of 105 and 140.

Find the HCF.

$$\begin{aligned} 140 &= 2 \times 2 \times \underline{5} \times \underline{7} \\ 105 &= 3 \times \underline{5} \times \underline{7} \end{aligned}$$
$$\text{HCF} = \underline{35}$$



10, 25

$$\begin{array}{l} \text{LCM} = 50 \\ \text{HCF} = 5 \end{array}$$

6, 10

$$\begin{array}{l} \text{HCF} = 2 \\ \text{LCM} = 30 \end{array}$$

15, 20

$$\begin{array}{l} \text{HCF} = 5 \\ \text{LCM} = 60 \end{array}$$

$$\begin{array}{l} \text{LCM} = 16 \\ \text{HCF} = 4 \end{array}$$

4, 16

$$\begin{array}{l} \text{HCF} = 3 \\ \text{LCM} = 36 \end{array}$$

9, 12

Express 6 and 8 as the product of their primes.

$$6 = 2 \times 3$$

$$8 = 2 \times 2 \times 2$$

$$\underline{\underline{\text{HCF} = 2}}$$

$$\text{LCM} = \underline{2 \times 2 \times 2} \times \underline{3} = \underline{24}$$

Find some common multiples of 6 and 8.

Find the lowest common multiple (LCM) of 6 and 8.

$$2 \times 2 \times 3 \times 11$$

$$\cancel{2 \times 5 \times 11}$$

$$\cancel{HCF} = 2 \times 2 \times 3 \times 1 \times 5 = 660$$

LCM

$$\cancel{2 \times 2 \times 3 \times 3 \times 5}$$

find the lcm of these numbers

$$2 \times 3 \times 3 \times 3 \times 7$$

$$\begin{aligned} \text{LCM} &= 2 \times 3 \times 3 \times 3 \times 7 \\ &\quad \times 2 \times 5 \\ &= 3780 \end{aligned}$$

$$5 \times 7 \times 7 \times 7 \times 11$$

$$\cancel{3 \times 7 \times 11 \times 11}$$

$$\begin{aligned} \text{LCM} &= 5 \times 7 \times 7 \times 7 \times 11 \\ &\quad \times 11 \times 3 \end{aligned}$$

page 105: E3 and E4
Extension (B) E5-E7

Lowest Common Multiple

Find the lcm of

$$\begin{array}{cc} 3,6 & 7,8 \\ \textcircled{6} & \textcircled{56} \\ 10,12 & 8,10 \\ \textcircled{60} & \textcircled{40} \end{array}$$

Find the prime factorisation of

10 and 35.

Find the LCM.

$$\begin{array}{l} 10 = 2 \times \cancel{5} \\ 35 = 5 \times 7 \end{array} \quad \begin{array}{l} \text{LCM} = 5 \times \cancel{7} \times 2 \\ = \underline{\underline{70}} \end{array}$$

Find the prime factorisation of

100 and 140.

Find the LCM.

$$\begin{array}{l} 100 = 2 \times 2 \times 5 \times 5 \\ 140 = 2 \times 2 \times \cancel{5} \times 7 \\ \text{LCM} = 2 \times 2 \times 5 \times 7 \times 5 = 700 \end{array}$$

Find the prime factorisation of

105 and 140.

Find the LCM.

$$\begin{array}{l} 105 = \cancel{5} \times 3 \times 7 \\ 140 = 2 \times 2 \times 5 \times 7 \\ \text{LCM} = 2 \times 2 \times 5 \times 7 \times 3 = 420 \end{array}$$

Express each pair of numbers as the product of their primes. Find the LCM and HCF for each pair.

1.) 8, 10 LCM = 40
HCF = 2

2.) 14, 20

3.) 15, 50 LCM = 150
HCF = 5

4.) 30, 80 LCM = 240
HCF = 10

5.) 45, 120 LCM = 360
HCF = 15

EXT: 6.) 210, 1540
LCM = 4620
HCF = 70

7. 3000, 780

6. $210 = 2 \times 3 \times 5 \times 7$

$1540 = 2 \times 2 \times 5 \times 7 \times 11$

HCF = $2 \times 5 \times 7 = 70$

LCM = $2 \times 2 \times 3 \times 5 \times 7 \times 11 = 4620$

7. $3000 = 2 \times 2 \times 2 \times 3 \times 5 \times 5 \times 5$

$780 = 2 \times 2 \times 3 \times 5 \times 13$

HCF = $2 \times 2 \times 3 \times 5 = 60$

LCM = $2 \times 2 \times 2 \times 3 \times 5 \times 5 \times 5 \times 13 \neq 39000$

Express 42 and 60 as the product of their primes.

Find some of the common multiples of 42 and 60.
Find the Lowest Common Multiple (LCM) of 42 and 60.

$15, 20$ 505 $15, 50$
 510
 $5, 10$ $10, 15$ $25, 30$
 $5, 15$

A pair of numbers have HCF of 5.
What numbers could they be?

$300, 255$ $50000, 5$
 $5, 65$ $5, 20$

A pair of numbers have HCF of 12.
What numbers could they be?

36
 48
 $12, 24$ $72, 24$ $144, 156$
 120
 1200 $48, 96$ $24, 36$ $12,$
 1212 120 144
 240 $HCF = 48$ $HCF = 120$

A pair of numbers have LCM of 15.

$1, 15$ $3, 5$

What numbers could they be?

Standard (index) Form

$$10^6 = 1\,000\,000$$

$$10^5 = 100\,000$$

$$10^4 = 10\,000$$

$$10^3 = 1\,000$$

$$10^2 = 100$$

$$10^1 = 10$$

$$10^0 = 1$$

$$10^{-1} = \frac{1}{10} \quad 10^{-2} = \frac{1}{10^2} = \frac{1}{100} \quad 10^{-3} = \frac{1}{10^3} = \frac{1}{1000}$$

p96 qu 2-9

A number written in standard form is written as a multiple of a power of 10.

The number is of the form $a \times 10^x$ where $1 \leq a < 10$

$26000 = 2.6 \times 10^4$
 $2300 = 2.3 \times 10^3$
 $560 = 5.6 \times 10^2$
 2.2×10^3

4×10^3
 3.2×10^4
 9×10^{-1}
 7.01×10^9
 6.3001×10^2

Which of these numbers are written in standard form?

two hundred and four

~~32 x 10~~

~~4.7 x 10⁴~~

~~0.76 x 10⁷~~

~~62 x 10⁶~~ = 0.069

2.3 x 10¹

6.9 x 10⁻²

$\frac{1}{100}$ 0.01

What does 10⁻² mean?

Write these numbers in standard form...

2600 = 2.6 x 10³

342 = 3.42 x 10²

0.3 = 3 x 10⁻¹

9 000 000 = 9 x 10⁶

0.00456 = 4.56 x 10⁻³

1400 = 1.4 x 10³

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34000 →

Calculations using sf

$$2 \times 10^3 \times 4 \times 10^5 = 8 \times 10^8$$

$$6 \times 10^2 \times 4 \times 10^8 = 24 \times 10^{10}$$

$$= 2.4 \times 10 \times 10^{10}$$

$$= 2.4 \times 10^{11}$$

$$= 8 \times 10^7$$

$$4 \times 10^4 \times 2 \times 10^3$$

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Large numbers in Standard form

- 1) $4.62 \times 10^2 =$
- 2) $3.56 \times 10^3 =$
- 3) $9.31 \times 10^6 =$
- 4) $7.38 \times 10^5 =$
- 5) $3.96 \times 10^7 =$
- 6) $9.872 \times 10^4 =$

- 1) $4 \times 10^3 \times 2 \times 10^5 = 8 \times 10^8$
- 2) $5 \times 10^6 \times 2 \times 10^{11} = 10 \times 10^{17} = 1 \times 10 \times 10^{17}$
- 3) $3 \times 10^6 \times 3 \times 10^2 = 9 \times 10^8 = 1 \times 10^{18}$
- 4) $9 \times 10^4 \times 3 \times 10^6 = 27 \times 10^{10} = 2.7 \times 10 \times 10^{10}$
- 5) $7 \times 10^{11} \times 6 \times 10^{12} = 42 \times 10^{23} = 4.2 \times 10^{24} = 2.7 \times 10^{11}$
- 6) $\frac{10^5 \times 6}{3 \times 10^2} = 2 \times 10^3 \frac{10000}{100}$
- 7) $\frac{8 \times 10^7}{2 \times 10^3} =$
- 8) $\frac{9 \times 10^{11}}{3 \times 10^4} =$

Express as a ordinary number:

$$5.1 \times 10^7 = \cancel{5}10000000$$
$$2.684 \times 10^6 = 2684000$$
$$3 \times 10^4 = 30000$$

Express in standard form:

$$567000 = 5.67 \times 10^5$$

$$310 = 3.1 \times 10^2$$

$$9123.78 = 9.12378 \times 10^3$$

Small numbers in Standard form

Write these numbers in standard form:

$$4000 = 4 \times 10^3$$

$$400 = 4 \times 10^2$$

$$40 = 4 \times 10^1$$

$$4 = 4 \times 10^0$$

$$0.4 = 4 \times 10^{-1}$$

$$0.04 = 4 \times 10^{-2}$$

$$0.004 = 4 \times 10^{-3}$$

$$32000 = 3.2 \times 10^4$$

$$3200 = 3.2 \times 10^3$$

$$320 = 3.2 \times 10^2$$

$$32 = 3.2 \times 10^1$$

$$3.2 = 3.2 \times 10^0$$

$$0.32 = 3.2 \times 10^{-1}$$

$$0.032 = 3.2 \times 10^{-2}$$

$$0.0032 = 3.2 \times 10^{-3}$$

$$0.00032$$

Write these as ordinary numbers:

$$a) 4.5 \times 10^{-1} = 0.45$$

$$e) 7.5 \times 10^{-3} = 0.0075$$

$$b) 3.6 \times 10^{-1} = 0.36$$

$$f) 3.06 \times 10^{-1} = 0.306$$

$$c) 4.5 \times 10^{-2} = 0.045$$

$$g) 4.05 \times 10^{-7} = 0.000000405$$

$$d) 3.6 \times 10^{-3} = 0.0036$$

$$h) 3.61 \times 10^{-6} = 0.00000361$$

Write these in standard form:

$$a) 0.3 = 3 \times 10^{-1}$$

$$e) 0.0303 = 3.03 \times 10^{-2}$$

$$b) 0.003 = 3 \times 10^{-3}$$

$$f) 0.0103 = 1.03 \times 10^{-2}$$

$$c) 0.13 = 1.3 \times 10^{-1}$$

$$g) 0.83 = 8.3 \times 10^{-1}$$

$$d) 0.073 = 7.3 \times 10^{-2}$$

$$h) 0.0000093 = 9.3 \times 10^{-6}$$

Red book: page 268 ex 4

Calculations using standard form

$$(2 \times 10^7) \times (3 \times 10^5) = 6 \times 10^{12}$$

$$2 \times 10^7 \times 6 \times 10^4 = 12 \times 10^{11} \\ = 1.2 \times 10 \times 10^{11} = 1.2 \times 10^{12}$$

$$7 \times 10^{-7} \times 3 \times 10^{11} = 21 \times 10^4 = 2.1 \times 10^5$$

$$9 \times 10^7 \times 8 \times 10^{-5} = 7.2 \times 10^3$$

$$8 \times 10^{-4} \times 3 \times 10^5 = 2.4 \times 10^2$$

$$\frac{6 \times 10^7}{3 \times 10^5} = 2 \times 10^2 \quad \frac{8 \times 10^7}{2 \times 10^1} = 4 \times 10^6$$

$$\frac{10 \times 10 \times 10 \times 10 \times 10 \times 10 \times 10}{10 \times 10 \times 10 \times 10 \times 10}$$

$$\frac{9 \times 10^4}{3 \times 10^5} = 3 \times 10^{-1} \quad \frac{3 \times 10^7}{6 \times 10^5} = 0.5 \times 10^2 \\ = 5 \times 10^{-1} \times 10^2 \\ = 5 \times 10$$

$$\frac{2 \times 10^8}{8 \times 10^5} = 0.25 \times 10^3 \quad \frac{3 \times 10^7}{9 \times 10^8} = 0.3 \times 10^{-1} \\ = 2.5 \times 10^1 \times 10^{-2} \quad = 3.3 \times 10^1 \times 10^{-1} \\ = 2.5 \times 10 \quad = 3.3 \times 10^{-2}$$

Rounding using significant figures

Round these numbers to 1, 2, 3 dp

	To 1sf	2sf	3sf
a) 3.4502 =↑	3	3.5	3.45
b) 34.8901	30	35	34.9
c) 89.9992	90	90	90.0
d) 301.4951	300	300	301

calculations practice page:

To round to a certain number of significant figures, consider zeros

in front of and behind the number as useful only for place value and round appropriately.

eg to 3 sf:

$$34056 = 34100 \text{ to 3 sf}$$

$$0.005672 = 0.00567 \text{ to 3 sf}$$

$$7.045 = 7.05 \text{ to 3 sf}$$

$$3050307 = 3050000 \text{ to 3 sf}$$

	To 1sf	2sf	3sf
a) 2.4602	2	2.5	2.46
b) 704.9901	700	700	705
c) 49.9892	50	50	50.0
d) 1.4951	1	1.5	1.50
e) 0.2345	0.2	0.23	0.235
f) 0.004 532 1	0.005	0.0045	0.00453
g) 0.000 004 985			

Using a calculator for standard form.

Use your calculator to work out :

$$430000 \times 26000 = 1.118 \times 10^{10}$$

You cannot copy the calculator's display into your book!

Your calculator is quite good at doing standard form!

Try

$$2 \text{ EXP } 3 = 2000$$

$$3 \text{ EXP } 5 = 300\ 000$$

$$4 \text{ EXP } 4$$

On your calculator work out:

$$2 \times 10^5 \times 6 \times 10^6 = 1.2 \times 10^{12}$$

$$2 \times 10^5 + 6 \times 10^6 = 6.2 \times 10^6$$

$$230000^2 = 5.29 \times 10^{10}$$

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Show hwk presentations

Exam questions page 352

Reciprocal

The reciprocal of a number is its inverse.
To find it turn the number upside down!

$$\frac{3}{4}$$

$$\frac{7}{8}$$

$$\left(\frac{1}{5}\right)^{-1} = 5 \quad 6^{-1} = \frac{1}{6}$$

Inverse
reciprocal

6

0.25

The reciprocal of $\frac{7}{9}$ is $\frac{9}{7}$

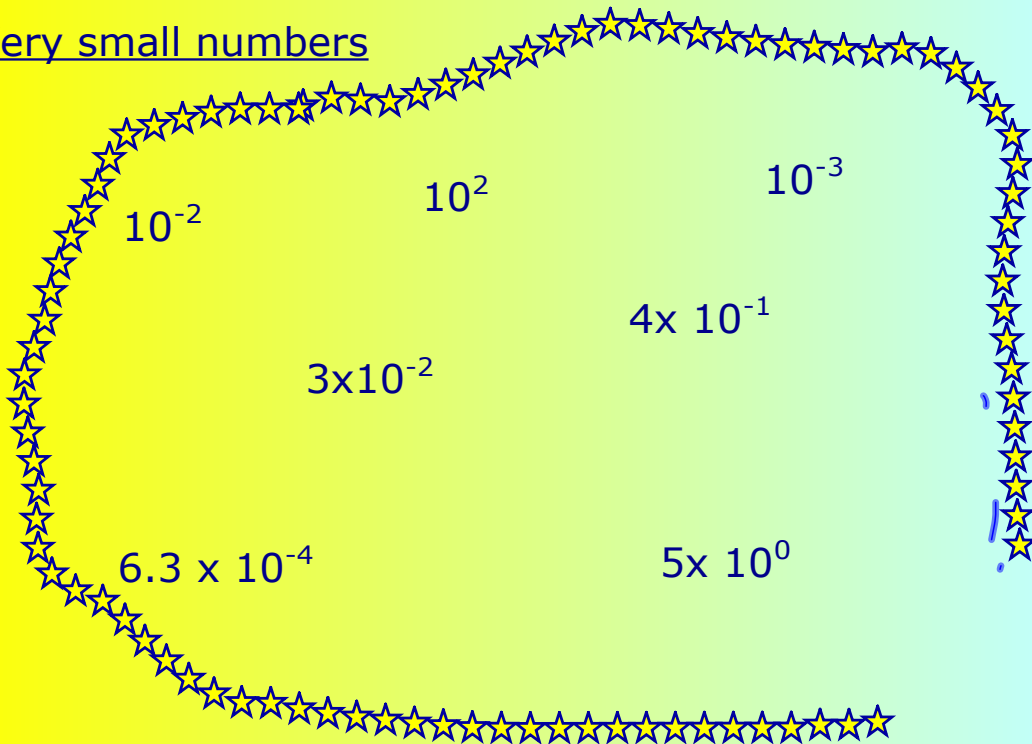
The inverse of $\frac{3}{8}$ is $\frac{8}{3}$

$$\left(\frac{5}{9}\right)^{-1} = \frac{9}{5}$$

$$\frac{1}{5^2 + 3 \times 15}$$

$$x^{-1}$$

Very small numbers



Write these as ordinary numbers:

a) 4.5×10^{-1}

e) 7.5×10^{-3}

b) 3.6×10^{-1}

f) 3.06×10^{-1}

c) 4.5×10^{-2}

g) 4.05×10^{-7}

d) 3.6×10^{-3}

h) 3.61×10^{-6}

Write these in standard form:

a) 0.3

e) 0.0303

b) 0.003

f) 0.0103

c) 0.13

g) 0.83

d) 0.073

h) 0.0000093

Attachments

indices homework.doc

standard form video.wmv