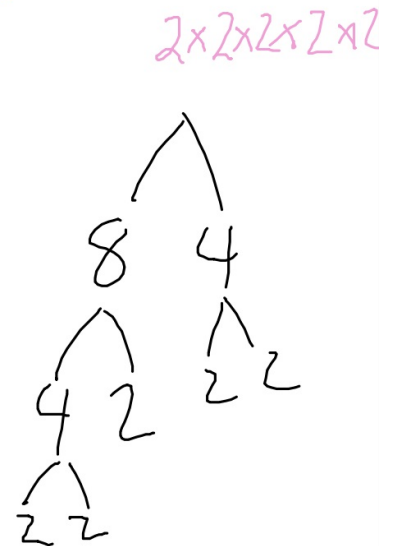


IB Math Studies 1 - BELL WORK (do this now)

Express each of the following numbers as a product of prime factors:

a $14 = 7 \times 2$ **b** $20 = 5 \times 2 \times 2$ **c** $28 = 7 \times 2 \times 2$ **d** $32 =$



Chapter

1

Number properties

- A** Words used in mathematics
- B** Exponent notation
- C** Factors of positive integers
- D** Multiples of positive integers
- E** Order of operations
- F** Special number sets

Assignment: questions?

D

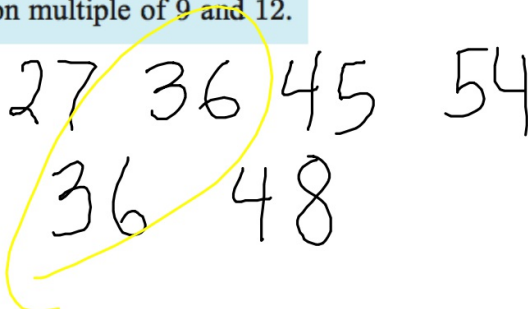
MULTIPLES OF POSITIVE INTEGERS

The **multiples** of any whole number have that number as a factor.

LOWEST COMMON MULTIPLE

Find the lowest common multiple of 9 and 12.

9	18	27	36	45	54
12	24	36	48		



RULES FOR ORDER OF OPERATIONS

- Perform operations within **B**rackets first.
- Calculate any part involving **E**xponents.
- Starting from the left, perform all **D**ivisions and **M**ultiplications as you come to them.
- Finally, working from the left, perform all **A**dditions and **S**ubtractions.

The word **BEDMAS** may help you remember this order.

PEMDAS

Simplify:

$$\begin{aligned} -(14 - 8) \div -2 \\ -6 \div -2 \\ 3 \end{aligned}$$

$$\begin{aligned} [3 - (-2 + 7)] + 4 \\ (3 - 5) + 4 \\ -2 + 4 = 2 \end{aligned}$$

$$\begin{aligned} \frac{38 - -4}{6 \times -7} &= \frac{42}{-42} \\ &= -1 \end{aligned}$$

$$\begin{aligned} \frac{28 - (-3 \times 4)}{10 \times -2} & \quad \frac{28 - -12}{-20} \\ & \quad \frac{40}{-20} = -2 \end{aligned}$$

USING A CALCULATOR you need to be careful that with fractions you place the numerator in brackets and also the denominator in brackets.

N

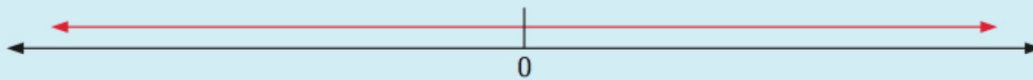
R

Z

COLIN DODDS - Number Types

· <https://youtu.be/m94WTZP14SAI>

- \mathbb{N} is the set of **natural** or **counting** numbers $0, 1, 2, 3, 4, 5, 6, 7, \dots$
- \mathbb{Z} is the set of all **integers** $0, \pm 1, \pm 2, \pm 3, \pm 4, \dots$
- \mathbb{Q} is the set of all **rational numbers**, or numbers which can be written in the form $\frac{p}{q}$ where p and q are integers and $q \neq 0$.
- \mathbb{R} is the set of all **real numbers**, which are all numbers which can be placed on the number line.



... -3, -2, -1, 0, 1, 2, ...

\mathbb{Q}

If we are considering positive numbers only, we indicate this with a + symbol:

- \mathbb{Z}^+ is the set of all **positive integers** 1, 2, 3, 4, 5, ...
- \mathbb{Q}^+ is the set of all **positive rational numbers**.
- \mathbb{R}^+ is the set of all **positive real numbers**.

$$\mathbb{N}^+ = \mathbb{Z}^+ \text{ and zero}$$

Example 15

Explain why:

- any positive integer is also a rational number
- -7 is a rational number

$$a) \quad 7 = \frac{7}{1}$$

$$b) \quad \frac{-7}{1} = -\frac{7}{1} = \frac{7}{-1}$$

All **terminating** and **recurring decimal numbers** can be shown to be rational.

Example 16

Self Tutor

Show that the following are rational numbers:

a 0.47

b 0.135

$$\frac{47}{100}$$

$$\frac{135}{1000}$$

All **terminating** and **recurring decimal numbers** can be shown to be rational.

Example 17

Show that the following recurring decimal numbers are rational

a 0.7777777....

b 0.363 636

a) $x = 0.7777\bar{7}$

$$10x = 7.777\bar{7}$$

$$10x = 7 + 0.7777\bar{7}$$

$$\begin{array}{r} 10x = 7 + x \\ -x \qquad -x \end{array}$$

$$\begin{array}{l} 9x = 7 \\ \hline x = \frac{7}{9} \end{array}$$

Example 17

Show that the following recurring decimal numbers are rational.

a $0.7777777\dots$

b $0.363636\dots$

b) $x = 0.363636\dots$
 $\times 100$ $\times 100$

$$100x = 36.3636\dots$$

$$100x = 36 + 0.363636\dots$$

$$100x = 36 + x$$

$$\frac{99x}{99} = \frac{36}{99}$$

$$x = \frac{36}{99}$$

IRRATIONAL NUMBERS

All real numbers are either rational or irrational.

Irrational numbers cannot be written in the form $\frac{p}{q}$ where p and q are integers, $q \neq 0$.

The set of irrational numbers is denoted by \mathbb{Q}' .

\mathbb{Q}'

What are some common irrational numbers?

π

e

REVIEW SET 1B

- 1 Zhang starts the day with \$487 in his wallet. During the day he buys lunch for \$12, pays \$175 in rent, and buys \$29 worth of phone credit. How much money is left in Zhang's wallet?
- 2 Every hour, a factory produces 23 boxes of soap. Each box contains 25 bars of soap. How many bars of soap are produced in an 8 hour working day?
- 3 Simplify: **a** $(-1)^4$ **b** $(-1)^{13}$ **c** $-(-2)^5$ **d** -7.1^2
- 4 Find the sum of all the odd numbers between 70 and 80.
- 5 Show that 2241 is a composite number.
- 6 Express each number as the product of prime factors in exponent form:
a 33 **b** 60 **c** 56
- 7 **a** List all the pairs of factors of 42. **b** Write down all the factors of 18.
- 8 Find the: **a** HCF of 48 and 45 **b** LCM of 12 and 20.
- 9 A shop runs a promotion in which every 500th customer receives a free gift, every 800th customer receives a voucher, and every 1200th customer gets a discount on their purchases. Which customer is the first to receive a free gift, a voucher, *and* a discount?

10 Evaluate: **a** $[8 - (1 + 2)] \times 3$ **b** $15 \div (2 + 3)$ **c** $6^2 \div 2 + 4$

11 Simplify: **a** $-3 \times (5 + 7)$ **b** $\frac{-4 \times 8}{24 \div 3}$ **c** $6 - (2 - 8)$

- 12 On the table, indicate with a tick or cross whether the numbers in the left hand column belong to \mathbb{Q} , \mathbb{R} , \mathbb{Z} , \mathbb{Q}' , or \mathbb{N} .

	\mathbb{Q}	\mathbb{R}	\mathbb{Z}	\mathbb{Q}'	\mathbb{N}
3.91					
$\sqrt{4}$					
-18					
π					
0					

