

Year 10 Spring 1 Knowledge Organiser

Unit 1: Ratio

Writing a Ratio

A ratio is the relationship between two or more numbers and each number is separate by a colon.



The ratio of footballs to rugby balls: 1:4

The ratio of rugby balls to footballs: 4:1

Ratio as fractions

If we wanted to represent the ratio as fractions then we first work out how many parts our ratio has in total.

1 : 4 has 5 parts in total (1 + 4)

Therefore it becomes:

$$\frac{1}{4} : \frac{4}{5}$$

Simplifying a ratio

You can make sure that your ratio has been simplified fully by finding the highest common factor.

Simplify **12 : 20**

Both 12 and 20 can be divided by 4 which leaves

$$3 : 5$$

Sharing in a ratio

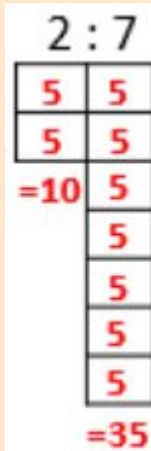
To share in a ratio we can use bar modelling to visualise the steps.

Share £45 in the ratio 2:7

$$2 + 7 = 9 \text{ parts}$$

$$45 \div 9 = 5$$

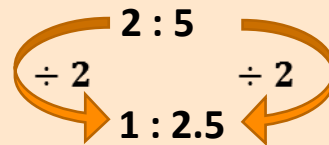
$$2 : 7 = \text{£}10:\text{£}35$$



Writing ratios as 1:n or n:1

We need to simplify our ratio so that 1 number ends up being 1.

Write **2 : 5** in the form **1 : n**

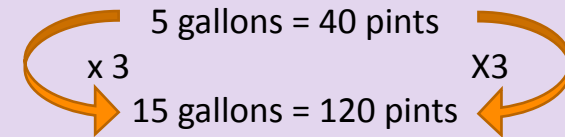


Unit 2: Proportion

Direct Proportion:

A relationship between two quantities such that as one increases/decreases, the other increases/decreases at the same rate.

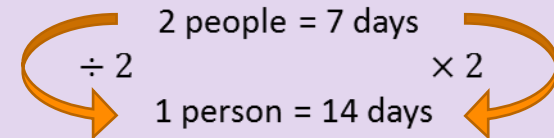
If 5 gallons is the same as 40 pints, calculate how many pints convert to 15 gallons.



Inverse Proportion:

A relationship between two quantities such that as one increase, the other decrease. This means we need to do the inverse calculation to the other quantity.

It takes 2 painters 7 days to paint a house. How many days does it take 1 painter to paint the same house



Unitary Method:

To calculate the value for a single item we can use the unitary method. This helps us with best buys and recipes.

$$\text{Price per unit} = \frac{\text{price}}{\text{quantity}}$$

$$\text{Weight per unit} = \frac{\text{weight}}{\text{quantity}}$$

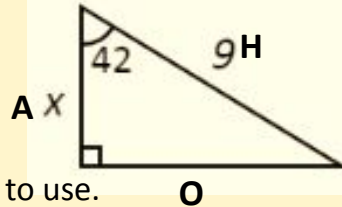
Year 10 Spring 1 Knowledge Organiser

Unit 4: Trigonometry

$$\sin \theta = \frac{\text{opp}}{\text{hyp}} \quad \cos \theta = \frac{\text{adj}}{\text{hyp}} \quad \tan \theta = \frac{\text{opp}}{\text{adj}}$$

Calculate the length of x.

1 – Label the sides as O, A or H.



2 – Use this to decide which trig ratio to use.

“I have the Hypotenuse and want to find the adjacent so I should use cos”

3 – Substitute the given values into the formula.

$$\cos 42 = \frac{x}{9}$$

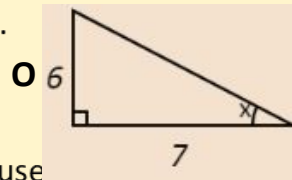
4 – Use inverse operations to rearrange & isolate x and then calculate:

$$9 \times \cos 42 = x$$

$$6.688\dots =$$

Calculate the size of angle x

1 – Label the sides you need as O, A or H.



2 – Use this to decide which trig ratio to use

“I have the Opposite and adjacent, so I should use tan”

3 – Substitute the given values into the formula.

$$\tan x = \frac{6}{7}$$

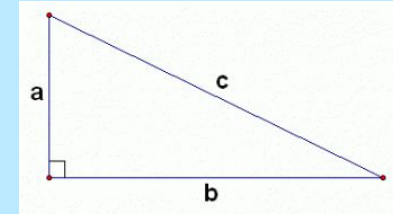
4 – Use inverses to rearrange & isolate x.

$$\tan^{-1}\left(\frac{6}{7}\right) = x \quad \text{and so } x = 40.60 \dots$$

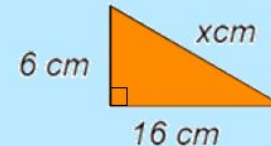
Unit 3: Pythagoras

Pythagoras Theorem can be used to calculate missing sides in right-angled triangles.

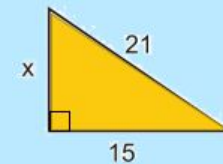
$$a^2 + b^2 = c^2$$



Finding the hypotenuse



Finding a shorter side



Substitute your values into the formulae: Substitute your values into the formulae:

$$6^2 + 16^2 = x^2$$

$$15^2 + x^2 = 21^2$$

Work out the values that you can.

Work out the values that you can.

$$36 + 256 = x^2$$

$$225 + x^2 = 441$$

$$292 = x^2$$

$$x^2 = 216$$

Now use inverse operations to isolate x. Now use inverse operations to isolate x.

$$\sqrt{292} = \sqrt{x^2}$$

$$\sqrt{x^2} = \sqrt{216}$$

$$17.088\dots = x$$

$$x = 14.697\dots$$

Key Terms:

Hypotenuse: The longest side in a right angled triangle.

Opposite: The side facing the angle in a right angled triangle.

Adjacent: The side next to the angle given in a right angled triangle.

Year 10 Spring 1 Knowledge Organiser

Quiz 1

Q1) $-5 - 4$

Q2) $-6 - -9$

Q3) $-4 - -2$

Q4) $4 + -4$

Q5) $3 + -4$

Quiz 2

Q1) $-8 + -7$

Q2) $-9 + 2$

Q3) $-1 - -7$

Q4) $-6 + -2$

Q5) $-5 + -9$

Quiz 3

Q1) -3×-6

Q2) -3×10

Q3) $\frac{42}{-6}$

Q4) -6×9

Q5) $\frac{-18}{-6}$

Quiz 4

Q1) 1×-7

Q2) $\frac{-16}{-8}$

Q3) -2×5

Q4) $\frac{-36}{-4}$

Q5) -9×8

Quiz 5

Q1) $(-4)^3$

Q2) $-6 + 5 \times -5$

Q3) $(-2)^2$

Q4) $-9 \times (-4 - -5)$

Q5) $8 + -3 \times 9$

Rate your performance on:

Negative numbers



Week 1



Year 10 Spring 1 Knowledge Organiser

Quiz 1

Q1) 68×4

Q2) 22×7

Q3) 25×3

Q4) 75×9

Q5) 55×8

Quiz 2

Q1) 22×7

Q2) 31×8

Q3) 59×8

Q4) 69×8

Q5) 92×3

Quiz 3

Q1) 673×53

Q2) 584×72

Q3) 966×94

Q4) 324×35

Q5) 460×66

Quiz 4

Q1) 323×68

Q2) 510×11

Q3) 971×19

Q4) 498×73

Q5) 327×76

Quiz 5

Q1) 9.4×0.74

Q2) 1.9×0.44

Q3) 0.98×0.12

Q4) 0.15×9.2

Q5) 5.2×0.89

Rate your performance on:

Multiplication



Week 2



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Quiz 1

Q1) $1056 \div 11$

Q2) $402 \div 6$

Q3) $610 \div 10$

Q4) $368 \div 4$

Q5) $128 \div 2$

Quiz 2

Q1) $588 \div 7$

Q2) $304 \div 8$

Q3) $272 \div 8$

Q4) $301 \div 7$

Q5) $600 \div 8$

Quiz 3

Q1) $438 \div 6$

Q2) $98 \div 7$

Q3) $125 \div 5$

Q4) $632 \div 8$

Q5) $328 \div 4$

Quiz 4

Q1) $3.7 \div 0.5$

Q2) $0.711 \div 0.09$

Q3) $0.847 \div 1.1$

Q4) $0.184 \div 0.8$

Q5) $0.045 \div 0.03$

Quiz 5

Q1) $0.15 \div 0.05$

Q2) $0.091 \div 0.1$

Q3) $0.115 \div 0.05$

Q4) $0.286 \div 0.11$

Q5) $5.81 \div 0.7$

Rate your performance on:

Division



Week 3



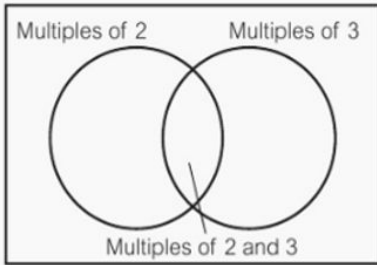
Year 10 Spring 1 Knowledge Organiser

Quiz 1

Look at these numbers:

2, 3, 4, 6, 8, 9, 10, 12, 14, 15, 16, 18.

- Which of the numbers are multiples of 2?
- Which are multiples of 3?
- Which are multiples of 2 and 3?
- Complete this **Venn diagram**

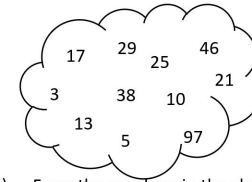


Quiz 2

List all the factors of:

- 36
- 25
- 20
- 70
- 52
- 43
- 81
- 100

Quiz 3



- From the numbers in the cloud, identify which numbers are prime and which are not
- How many prime numbers are there between 0 and 25?
- Is 1 a prime number? Explain why

Quiz 4

Express as a product of Prime factors:

Q1) 90

Q2) 100

Q3) 225

Q4) 18

Q5) 60

Quiz 5

Find the LCM and HCF

Q1) 15 and 9

Q2) 16 and 10

Q3) 28 and 20

Q4) 20 and 24

Q5) 25 and 15

Rate your performance on:

Factors, Multiples and Primes



Week 4



Year 10 Spring 1 Knowledge Organiser

Quiz 1

Simplify:

Q1) $\frac{6}{21}$

Q2) $\frac{25}{35}$

Q3) $\frac{2}{8}$

Q4) $\frac{5}{50}$

Q5) $\frac{12}{20}$

Quiz 2

Simplify:

Q1) $\frac{28}{84}$

Q2) $\frac{54}{72}$

Q3) $\frac{72}{162}$

Q4) $\frac{144}{180}$

Q5) $\frac{70}{280}$

Quiz 3

Find the missing number:

Q1) $\frac{4}{?} = \frac{6}{21}$

Q2) $\frac{14}{?} = \frac{10}{25}$

Q3) $\frac{?}{10} = \frac{3}{15}$

Q4) $\frac{18}{21} = \frac{?}{35}$

Q5) $\frac{5}{?} = \frac{2}{6}$

Quiz 4

Complete the blanks:

Q1) $\square = 1\frac{4}{5}$

Q2) $\frac{11}{2} = \square$

Q3) $\frac{13}{3} = \square$

Q4) $\frac{5}{3} = \square$

Q5) $\square = 1\frac{2}{3}$

Quiz 5

Complete the blanks:

Q1) $\square = 4\frac{2}{3}$

Q2) $\frac{13}{4} = \square$

Q3) $\square = 4\frac{1}{3}$

Q4) $\frac{13}{5} = \square$

Q5) $\square = 2\frac{1}{4}$

Rate your performance on:

Fractions I



Week 5



Year 10 Spring 1 Knowledge Organiser

Quiz 1

Q1) $\frac{3}{5} + \frac{1}{2}$

Q2) $\frac{1}{3} + \frac{1}{2}$

Q3) $\frac{2}{3} + \frac{2}{5}$

Q4) $\frac{1}{2} + \frac{4}{5}$

Q5) $\frac{3}{4} + \frac{1}{3}$

Quiz 2

Q1) $\frac{1}{2} - \frac{1}{4}$

Q2) $\frac{2}{3} - \frac{1}{2}$

Q3) $\frac{4}{5} - \frac{3}{4}$

Q4) $\frac{3}{4} - \frac{2}{3}$

Q5) $\frac{2}{3} - \frac{2}{5}$

Quiz 3

Q1) $4\frac{3}{4} + 4\frac{3}{5}$

Q2) $2\frac{2}{5} + 1\frac{1}{3}$

Q3) $2\frac{2}{5} + 2\frac{2}{4}$

Q4) $3\frac{3}{5} - 2\frac{1}{3}$

Q5) $4\frac{1}{5} - 1\frac{2}{3}$

Quiz 4

Q1) $\frac{3}{5} \times \frac{3}{4}$

Q2) $\frac{2}{5} \times \frac{3}{4}$

Q3) $\frac{2}{5} \times \frac{2}{3}$

Q4) $\frac{1}{6} \times \frac{3}{5}$

Q5) $\frac{1}{9} \times \frac{3}{7}$

Quiz 5

Q1) $\frac{3}{4} \div \frac{4}{5}$

Q2) $\frac{1}{4} \div \frac{2}{5}$

Q3) $\frac{3}{4} \div \frac{2}{3}$

Q4) $\frac{3}{4} \div \frac{3}{8}$

Q5) $\frac{5}{7} \div \frac{5}{9}$

Rate your performance on:

Fractions II



Week 6

