Year 11 – Maths (Foundation)

Knowledge Organiser

Name_____

Maths Class:_____

Year 11 Foundation Week 1 Number Sequences

Eg 1 Missing Terms

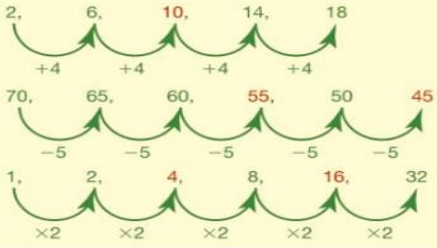
Find the missing terms in these sequences.

a 2, 6, □, 14, 18 **b** 70, 65, 60, □, 50, □ **c** 1, 2, □, 8, □, 32

a Look at the difference between terms.
Rule is add 4.
10

b Look at the difference between terms.
Rule is subtract 5.
55, 45

c Look at the ratio of terms.
Rule is multiply by 2.
4, 16



Steps
1. Identify type of sequence i.e. Arithmetic/Geometric
2. Identify difference/ratio
3. Find missing terms

Eg 2 Sequences from nth Term

1) The n^{th} term of a sequence is **3n – 1**.
Write the first five terms

1^{st} term = 3 x 1 – 1 = 2
2^{nd} term = 3 x 2 – 1 = 5
3^{rd} term = 3 x 3 – 1 = 8
4^{th} term = 3 x 4 – 1 = 11
5^{th} term = 3 x 5 – 1 = 14

2, 5, 8, 11, 14

2) The n^{th} term of a sequence is **4r**
Write the first five terms

1^{st} term = 4 x 1 + 3 = 7
2^{nd} term = 4 x 2 + 3 = 11
3^{rd} term = 4 x 3 + 3 = 15
4^{th} term = 4 x 4 + 3 = 19
5^{th} term = 4 x 5 + 3 = 23

7, 11, 15, 19, 23

Steps
1. Substitute term number for each value of n
2. Calculate each term
3. Use the difference to calculate following terms

Eg 3 nth Term

What would the 0 term be?

The 'nth term' rule **+3n + 1**

1 2 3 4 5 6
1 4, 7, 10, 13, 16, 19, .

+3 +3 +3 +3 +3

Steps
1. Find the common difference
2. Find the 0 term
3. Complete the formula

Number Sequences

Missing Terms

Each sequence below increases/decreases by the same amount each time.
Find the missing terms.

(a) 4, □, 8, 10, ... (b) 2, 5, □, 11, ... (c) 5, 9, □, 17, ...

(d) 25, □, 37, 43, ... (e) 15, 24, □, 42, ... (f) 34, □, 24, 19, ...

(g) 18, □, 40, 51, ... (h) 1, □, □, 19, ... (i) 3, □, □, 27, ...

(j) 18, □, □, 39, ... (k) 6, □, □, □, 42, ...

Apply

Here are the first four terms of a number sequence 9, 15, 21, 27, . .

(a) Write down the next term of the number sequence.
(b) Explain how you found your answer to (a)

James says that the 20th term of the sequence is 122

(c) Explain why James must be wrong.

1) The nth term of a number sequence is $2n + 5$

Write down the first three terms of the sequence.

2) The nth term of a number sequence is $3n - 1$

Write down the first four terms of the sequence.

3) The nth term of a number sequence is $3n + 2$

Write down the first four terms of the sequence.

4) The nth term of a number sequence is $5n - 7$

Write down the first four terms of the sequence.

5) The nth term of a number sequence is n^2

Write down the first three terms of the sequence.

6) The nth term of a number sequence is $n^2 + 3$

Write down the first three terms of the sequence.

nth Term

Question 1: Find the n^{th} term for each of the following sequences

(a) 5, 8, 11, 14, ... (b) 9, 14, 19, 24, ... (c) 1, 3, 5, 7, ...

(d) 10, 14, 18, 22, ... (e) 2, 7, 12, 17, ... (f) 3, 9, 15, 21, ...

(g) 11, 31, 51, 71, ... (h) 20, 23, 26, 29, ... (i) 1, 7, 13, 19, ...

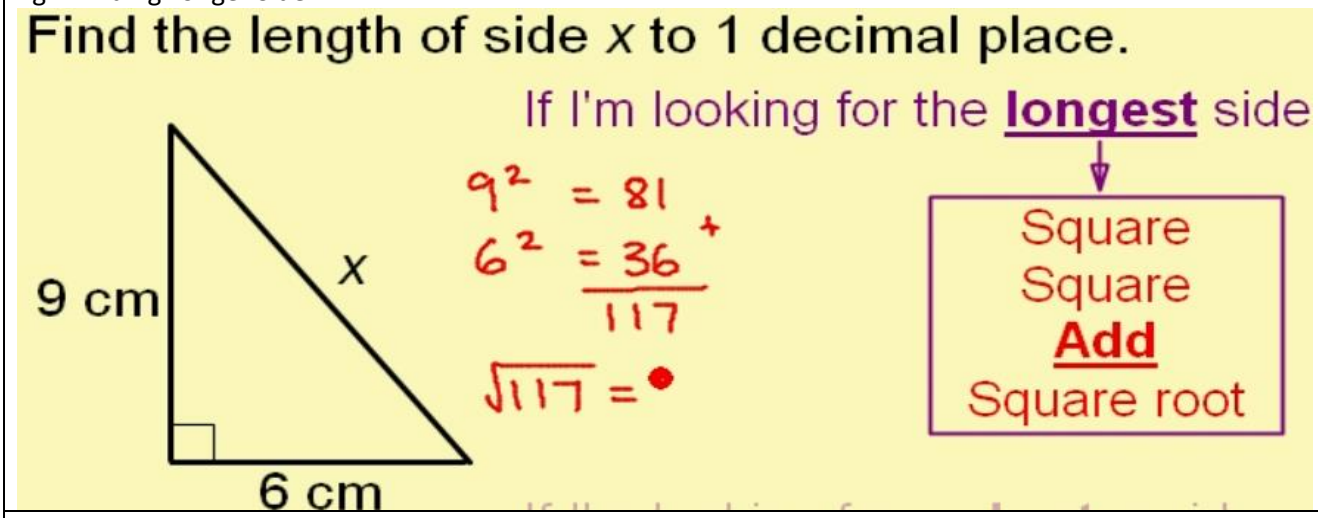
Question 2: Find the n^{th} term for each of the following sequences

(a) 10, 7, 4, 1, ... (b) 6, 4, 2, 0, ... (c) 9, 4, -1, -6, ...

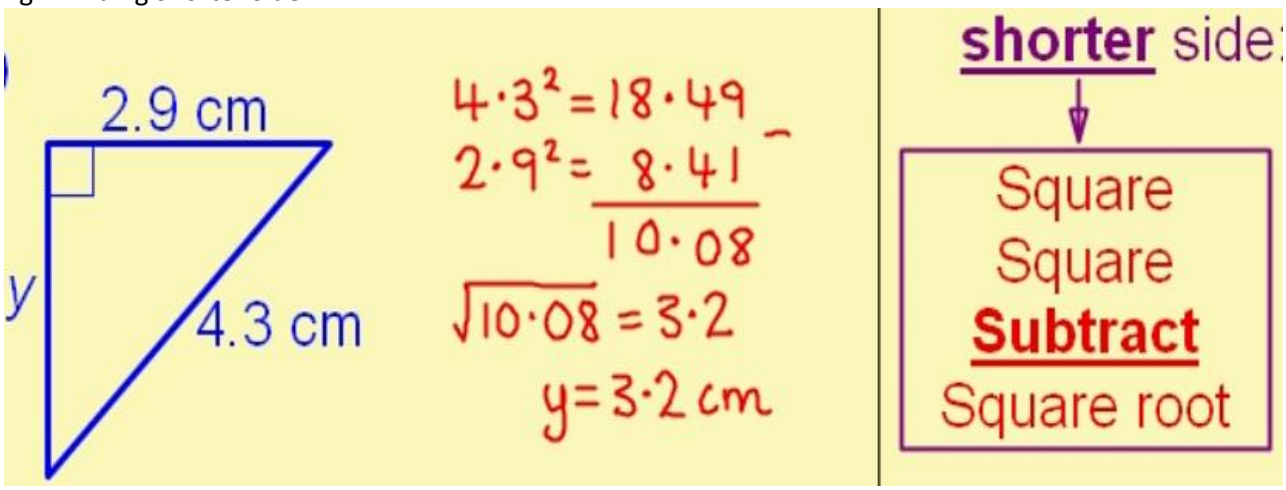
(d) 20, 10, 0, -10, ... (e) 5, -1, -7, -13, ... (f) 5, 4, 3, 2, ...

Week 2 Pythagoras

Eg 1 Finding Longer Side



Eg 2 Finding Shorter Side



Eg 3 Length of Line Segments

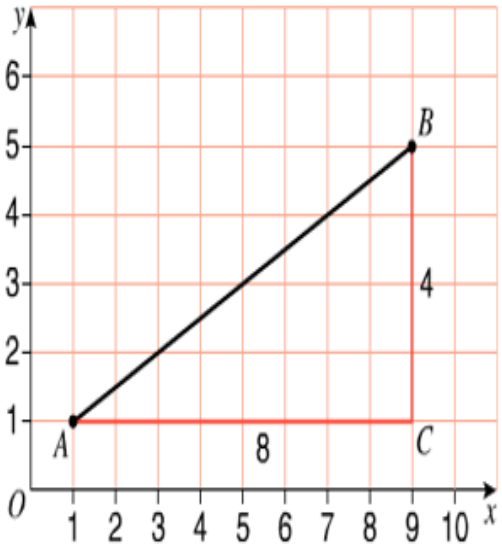
The diagram shows the points $A(1, 1)$ and $B(9, 5)$. The right-angled triangle ABC has been drawn so that $AC = 8$ and $BC = 4$

Pythagoras' theorem can be used to find the length of AB.

$AB^2 = 8^2 + 4^2$

$AB^2 = 64 + 16 = 80$

$AB = \sqrt{80} = 8.94$ (to 2 d.p.)

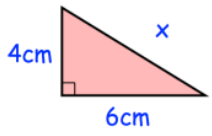


Pythagoras

Missing Side

Calculate x for each right angle triangle.
Give each answer to 2 decimal places.

(a)



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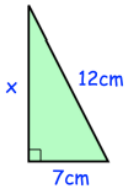

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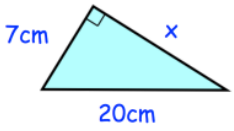

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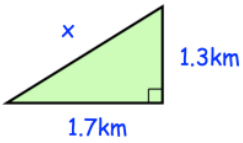

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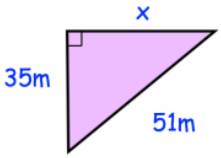

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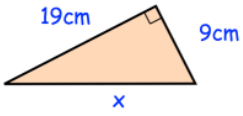
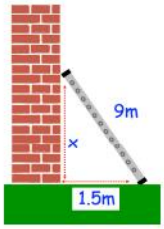
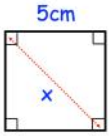


Apply

Question 1: A 9m ladder is placed against a wall.
The foot of the ladder is 1.5m from the foot of the wall.
How far up the wall does the ladder reach?

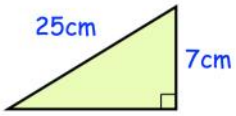


Question 2: Shown is a square with side length 5cm.
Find the length of the diagonal, x.



Question 3: Shown is a right angle triangle.
Calculate:

(a) the perimeter of the triangle.
(b) the area of the triangle.

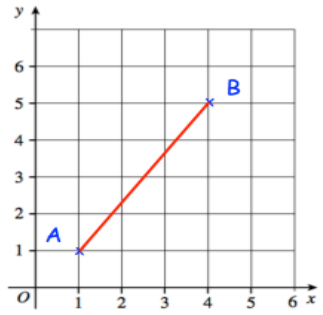


Question 4: A rectangle is 20cm long and 8cm wide.
Find the length of the diagonal of the rectangle.

Line Segment

Question 1: Calculate the length of the line joining the points A and B.

(a)



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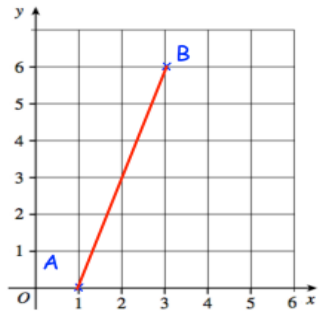

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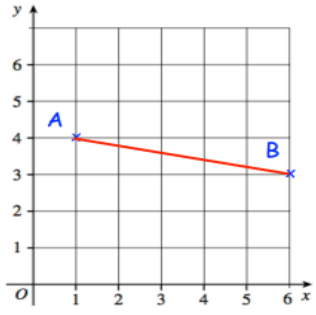
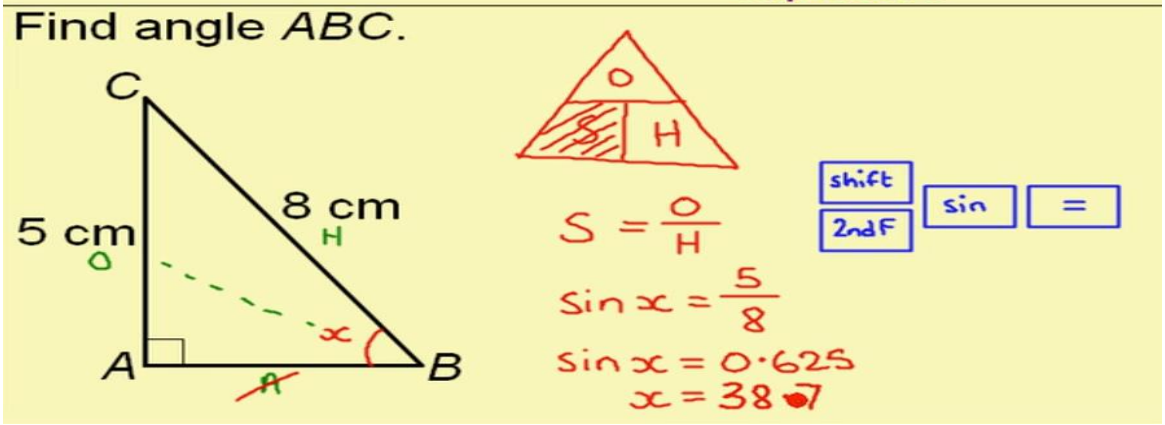


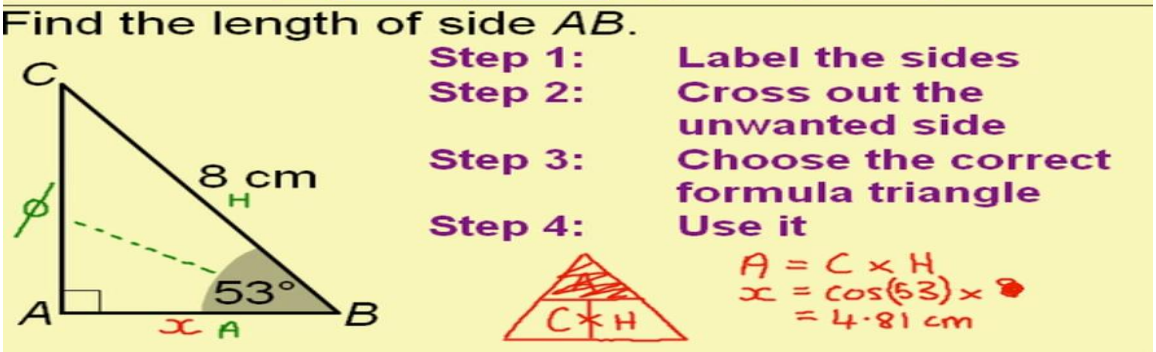
Week 3 SOHCAHTOA

Eg 1 Finding the Angle



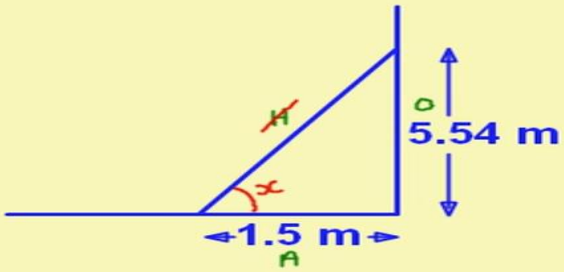
Eg 2

Finding a Missing Side



Eg 3

For a ladder to be safe it must be inclined at between 70° and 80° to the ground.
The diagram shows a ladder resting against a wall.
Is it safe? You must show your working.



$T = \frac{O}{A}$

$\tan x = \frac{5.54}{1.5}$

$= 3.693333333$

$x = 74.8°$

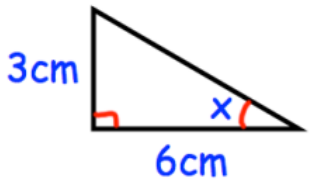
Yes, the ladder is safe.

Trigonometry

Missing Angle

Find the size of the missing angles in the triangles below.

(a)



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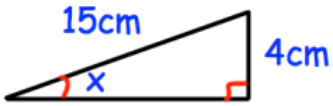

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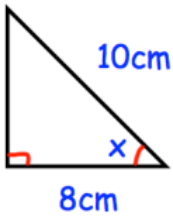

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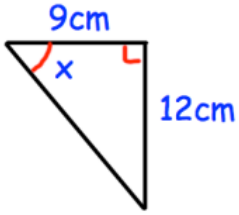

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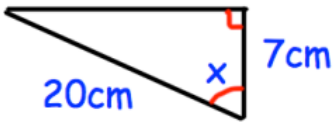

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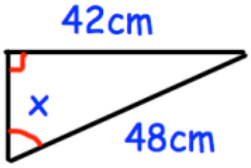
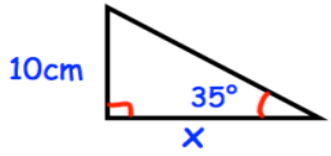


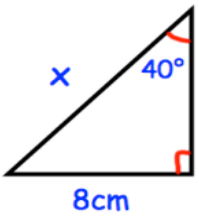
Missing Side

Find the lengths of the sides labelled x below.

(a)



(b)



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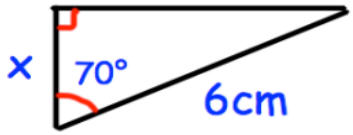

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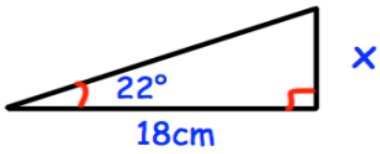

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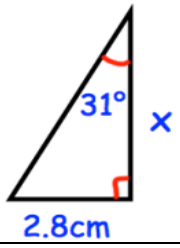

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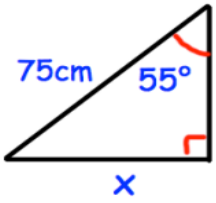


Apply

Question 1: A 4 metre long ladder is placed against a wall. The angle between the ladder and the ground is 75°. How far up the wall does the ladder reach?

Question 2: A 5 metre long ladder is placed against a wall. It reaches 4.3 metres up the wall. What is the angle between the ladder and the ground?

Question 3: A ladder is placed against a wall.
The base of the ladder is 4 foot from the bottom of the wall.
The angle between the ladder and the ground is 80°.
What is the length of the ladder?

Week 4 3D Shapes

Properties of 3D Shapes

Face:

→ The faces of a shape are its 'sides'. They are areas

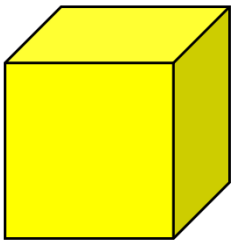
Edge:

→ The edges of a shape are the lines that make it's 'skeleton'

Vertex/Vertices:

→ The vertices of a shape are its 'corners'

So how many Faces, Edges and Vertices does this cube have?



Faces: 6

Edges: 12

Vertices: 8

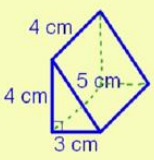
For a polyhedron there is a relationship between the number of faces F, edges E and vertices V

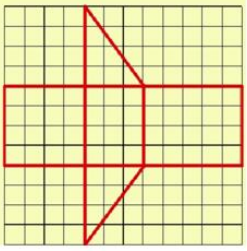
The relationship is: $F + V - E = 2$

Nets of 3D Shapes

A **net** of a 3-D shape is a flat (two-dimensional) shape which can be cut out and folded to make the 3-D shape.

Draw a net of this triangular prism on the cm grid.





Steps

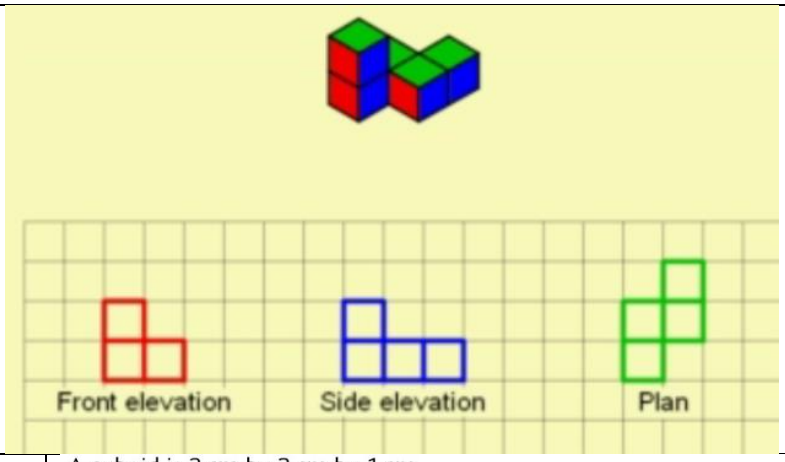
1. Identify faces of the 3D shapes
2. Accurately draw the shape as it unfolds
3. Use correct dimensions for each face

Plans and Elevations

- When architects design buildings, they often sketch 2D drawings to show what the building will look like from each **side**. These drawings are called **plans** and **elevations**. The view from the top is called the **plan**. The view from the **front** and **sides** are called the **elevations** (**front elevation** and **side elevation**).

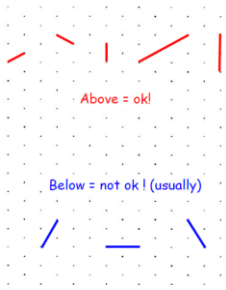
Steps

1. Shade the faces seen from each view
2. Draw a 2D representation of each view

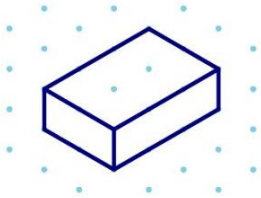


Isometric Drawings

- Isometric paper is paper with dots arranged in equilateral triangles
- When drawing objects on isometric paper, you very rarely (if ever) join dots across wider gaps
- They usually join to dots directly next to them...



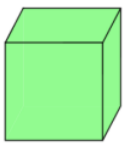
A cuboid is 3 cm by 2 cm by 1 cm.
On an isometric grid, make an accurate, full size drawing of the cuboid.

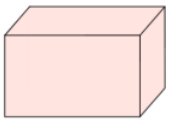


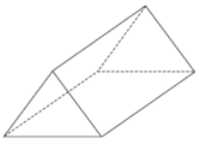
3D Shapes

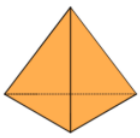
Properties

For each 3D shape below, write down how many edges, faces and vertices it has.

(a) 

(b) 

(c) 

(d) 

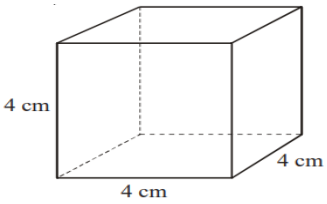
(e) 

(f) 

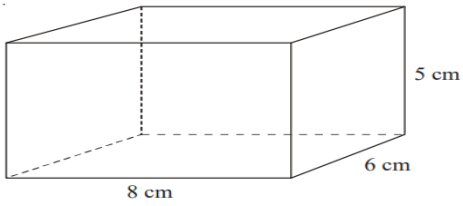
Nets

On squared paper draw accurate nets of these solids.

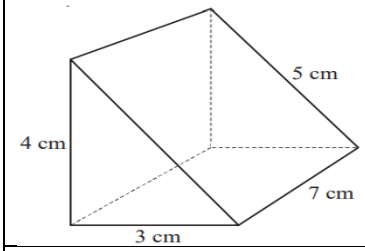
a) **Cube**



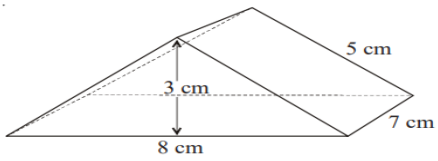
b) **Cuboid**



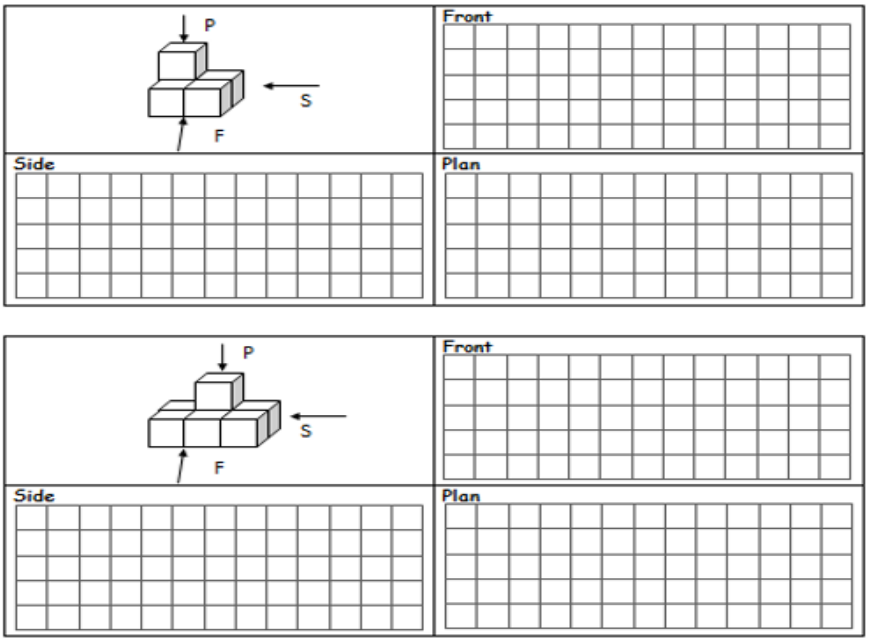
c) **Right-angled triangular prism**



d) **Triangular prism**



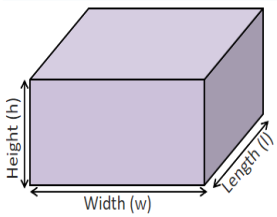
Plans and Elevations



Week 5 Volume of Prisms

Eg1 Volume of Cuboids

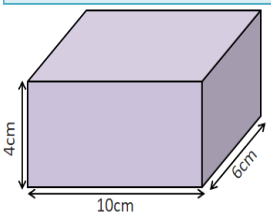
How can we work out the volume of a cuboid?



Volume of a cuboid = Length x width x height

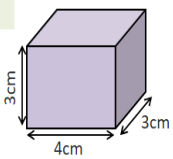
V = l x w x h

Work out the volumes of these cuboids.



6 x 10 x 4 =

240cm^3



3 x 4 x 3 =

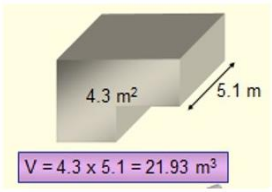
36cm^3

Eg 2 Volume of Prisms

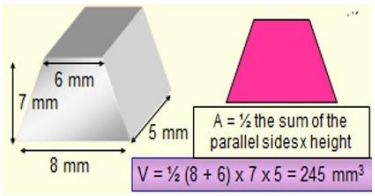
Prisms are **3 dimensional** shapes that have a **constant cross-sectional** area.

The volume of any prism is simply its: **cross-sectional area x length**

Eg 1

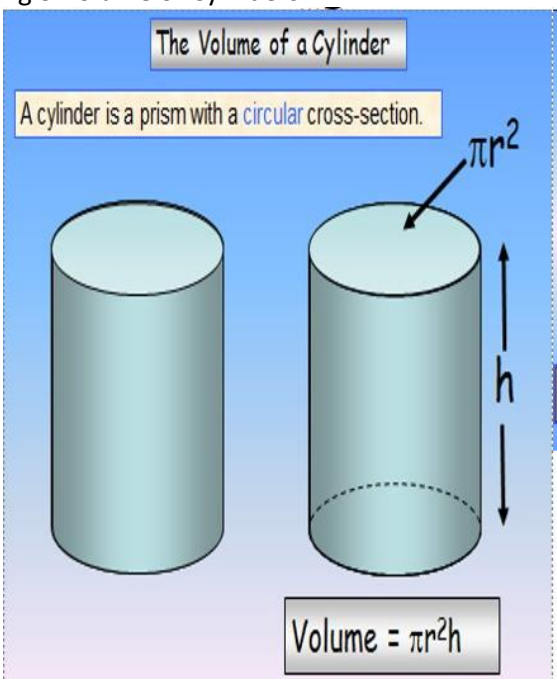


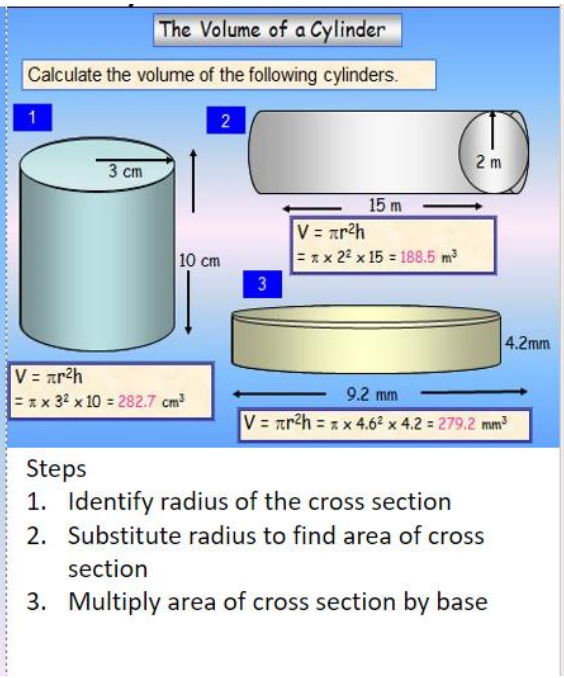
Eg 2



Steps
1. Identify the cross section of the prism
2. Calculate the cross sectional area
3. Multiply by the length

Eg 3 Volume of Cylinders





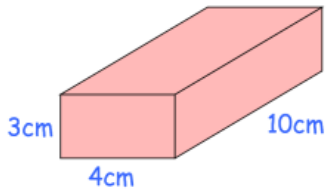
Steps
1. Identify radius of the cross section
2. Substitute radius to find area of cross section
3. Multiply area of cross section by base

Volume of Prisms

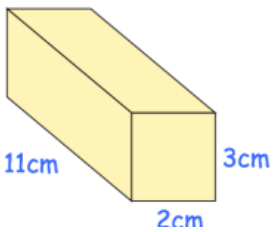
Cuboids

Calculate the Volume

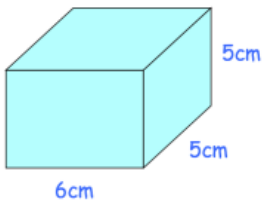
(a)



(b)

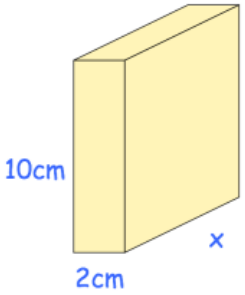


(c)

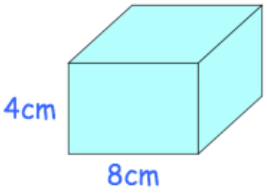


Find the missing Length

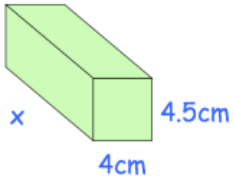
(a) Volume: 140cm³



(b) Volume: 160cm³



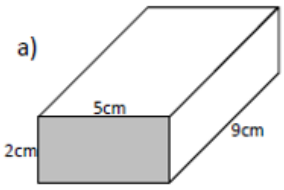
(c) Volume: 432cm³



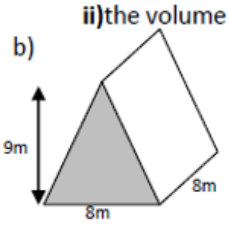
Prisms

For the following prisms find **i)** the area of the cross section
ii)the volume of the prism

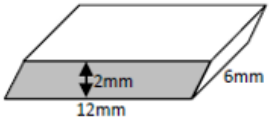
a)



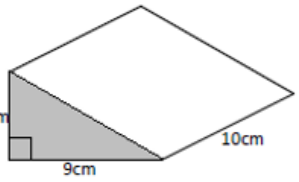
b)



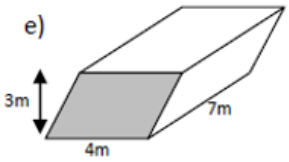
c)



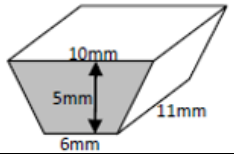
d)

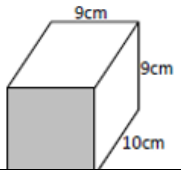


e)

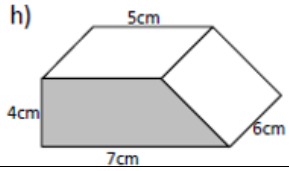


f)





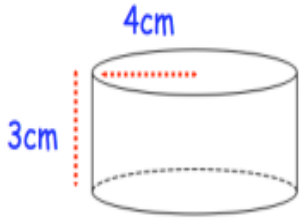
h)



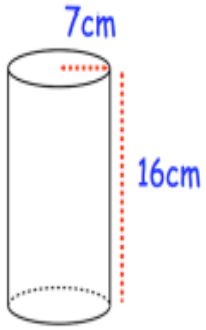
Cylinders

Calculate the Volume of the Cylinders

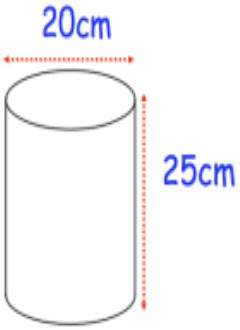
(a)



(b)

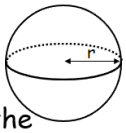


(c)



Volume and Surface Area of Non Prisms

Eg 1 Spheres



The Volume of a Sphere is given by the following formula:

$$Volume = \frac{4\pi r^3}{3}$$

$$Volume = \frac{4}{3}\pi r^3$$

You will usually be given this formula on exams!

- Find the Volume of a Sphere with a radius of 3.2m

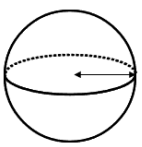
$$Volume = \frac{4\pi r^3}{3}$$

Sub in the value of r

$$Volume = \frac{4 \times \pi \times 3.2^3}{3}$$

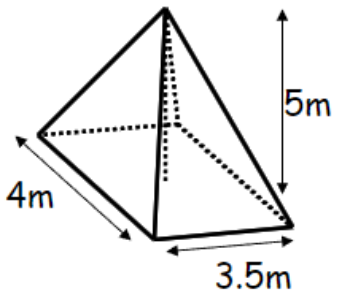
Calculate

$$Volume = 137.26cm^3$$



Eg 2

Volume of a Pyramid



$$Volume = \frac{Area\ of\ Base \times Height}{3}$$

Sub in values

$$Volume = \frac{4 \times 3.5 \times 5}{3}$$

Calculate

$$Volume = 23.3cm^3$$

Eg 3

• Volume of a Cone

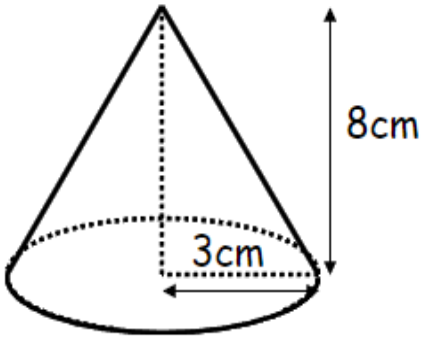
$$Volume = \frac{Area\ of\ Base \times Height}{3}$$

Sub in values

$$Volume = \frac{\pi \times 3^2 \times 8}{3}$$

Calculate

$$Volume = 75.4cm^3\ (24\pi)$$



Volume of Non Prisms

Spheres

Find the volume of each of these spheres.
Give your answers to three significant figures (you may use a calculator)

(a) A sphere with radius 9cm

(b) A sphere with diameter 38cm

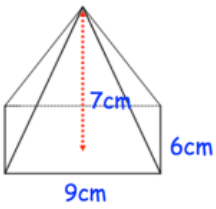
(c) A sphere with diameter 6.7cm

(d) A sphere with radius 1.25 inches.

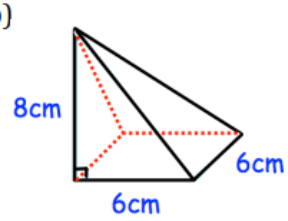
Pyramids

Find the volume of each of these pyramids.
Give each answer to one decimal place (you may use a calculator)

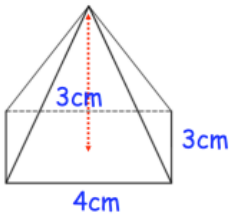
(a)



(b)

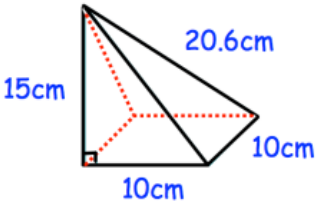


(c)

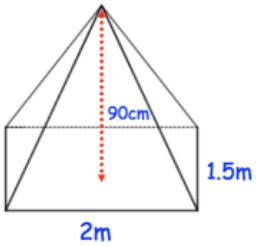


(d)

(e)



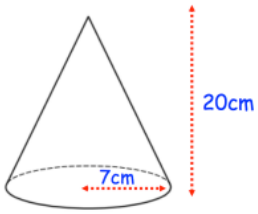
(f)



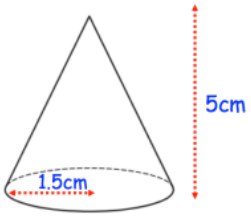
Cones

Question 1: Work out the volumes of each of following cones.
Give each answer to one decimal place.

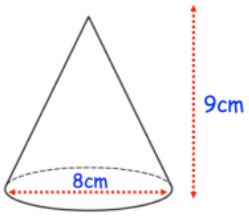
(a)



(b)

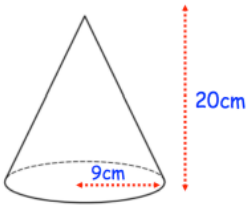


(c)

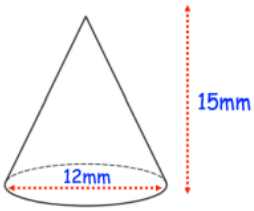


Question 2: Work out the volumes of each of the following cones.
Give each answer in terms of **π**

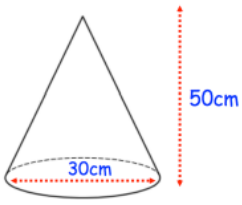
(a)



(b)



(c)



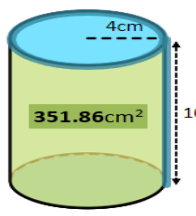
Surface Area

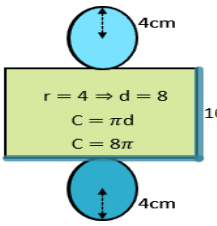
Eg 1

Surface Area of a Cylinder

Eg1 Draw the net of the following cylinder and use it to work out its surface area.

Solution





Area of ○ $= \pi r^2$
$= \pi \times 4^2$
$= 16\pi$

○ + ○ $= 16\pi \times 2 = 32\pi$

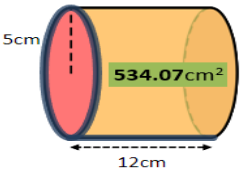
Area of ▭ $= 8\pi \times 10$
$= 80\pi$

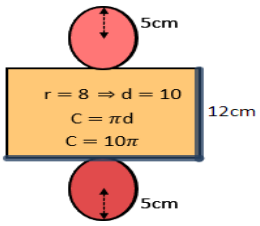
Total SA $= 32\pi + 80\pi$
$= 112\pi cm^2$

Steps
1. Calculate the area of the circular parts ($2\pi r^2$)
2. Calculate area of rectangular parts (x circumference by height)
3. Add answers from steps 1 and 2.

Eg2 Draw the net of the following cylinder and use it to work out its surface area.

Solution





Area of ○ $= \pi r^2$
$= \pi \times 5^2$
$= 25\pi$

○ + ○ $= 25\pi \times 2 = 50\pi$

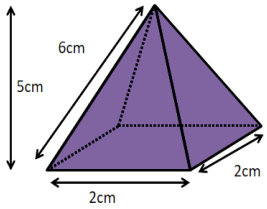
Area of ▭ $= 10\pi \times 12$
$= 120\pi$

Total SA $= 50\pi + 120\pi$
$= 170\pi cm^2$

Eg 2

Find the surface area of this pyramid.

Eg



A square-based pyramid

Remember: surface area is the area of all of the surfaces (faces) so think about what the net of the pyramid is and work out the area of those shapes

Base Area= $2^2 = 4$

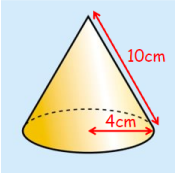
Area of triangular faces
$= (2 \times 6)/2 \times 4 = 24$

Total Area=24+4
$= 28cm^2$

Steps
1. Calculate area of the base
2. Calculate area of triangular faces
3. Add answers from step 1 & 2

Eg3

- Calculate the Surface Area of this Cone



$Curved\ Area = \pi rl$
$Curved\ Area = \pi \times 10 \times 4$
$Curved\ Area = 125.66cm^2\ (40\pi)$

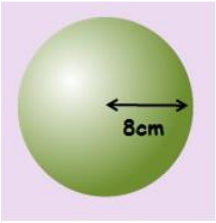
$Base = \pi r^2$
$Base = \pi \times 4^2$
$Base = 50.27cm^2\ (16\pi)$
$Total = 175.93cm^2\ (56\pi)$

Steps
1. Calculate curved SA(πrl)
2. Calculate area of base(πr^2)
3. Add areas to find total.

Eg 4

Surface area of a sphere = 4 x π x r²

Calculate the surface area of the sphere below:



Surface area = 4 x π x 8²
= 804.2 cm²

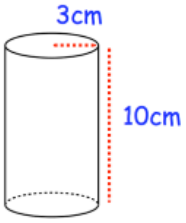
Steps
1. Identify the radius
2. Substitute radius into the formula
3. Round to a degree of accuracy

Surface Area of Non Prisms

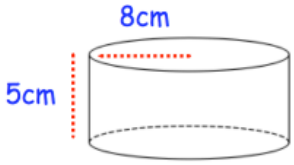
Cylinders

Work out the surface area of each of the following cylinders.
Give each answer to 2 decimal places.

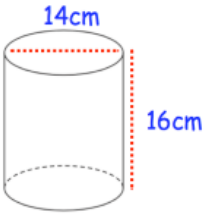
(a)



(b)

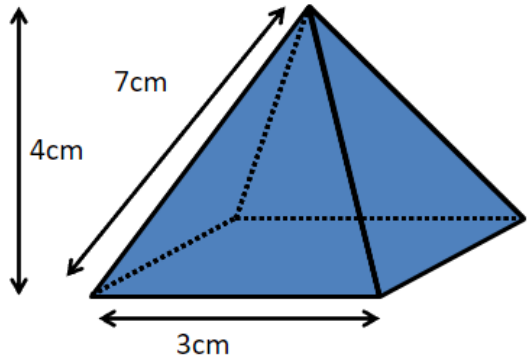


(c)

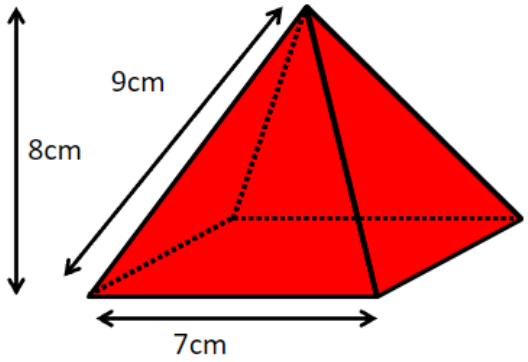


Pyramids

Calculate the Surface Area



A square-based pyramid

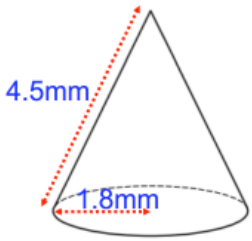


A square-based pyramid

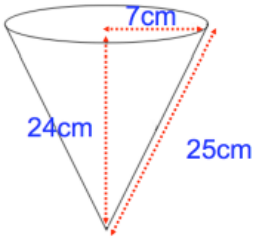
Cones

Calculate the Surface Area of the Cones

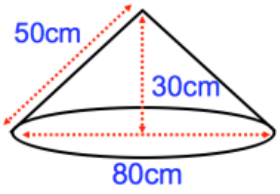
(a)



(b)



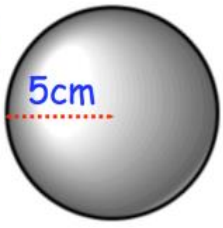
(c)



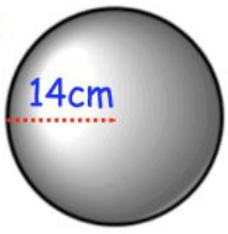
Spheres

Calculate the Surface Area of the Spheres

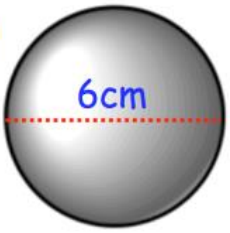
(a)



(b)



(c)



Percentages 1

% of Amounts Non Calculator

10% = divide by 10
(1% = divide by 10 again)

50% = divide by 2
(25% = divide by 2 again)

Eg 1

Find 15% of £280

10% → £28
5% → £14
15% → £42

Eg 2 Apply

Phil works out that yesterday he spent a third of the day asleep, $\frac{3}{8}$ of the day watching TV, a tenth eating, and a quarter at school.

Is he correct?
How can you tell?

1/3 =8 hours
3/8=9 hours
1/10=2.4hours
¼= 6 hours
Total=25.2 hours
He is incorrect

Eg 3 Expressing as a %

Write 45 cm out of 2 m as a percentage.

$2\text{ m} = 200\text{ cm}$

$\frac{45}{200}$

$\frac{45}{200} \times 100 = 22.5\%$

Change 11 out of 20 to a percentage.

$\frac{11}{20}$

$\frac{11}{20} = \frac{55}{100}$ (×5)

$\frac{55}{100} = 55\%$

11 out of 20 = 55%

Eg 4 Comparing Percentages

In a test,

Section A has 80 marks

Section B has 120 marks.

Riya scores

55% in Section A

70% in Section B.

To pass, Riya needs to score 65% of the **total** marks.

Does she pass?

You **must** show your working.

44 + 84 =128 Riya's Score

65% of 200=130 Score to pass

Riya does not pass

Percentages 1

% of amount non calculator

(a) 20% of 30km (b) 5% of £60 (c) 2% of 600m (d) 30% of 70p

(e) 3% of $9000 (f) 40% of 75 seconds (g) 15% of 90 hours (h) 5% of 14kg

(i) 60% of 30km (j) 30% of £40 (k) 70% of 900cm (l) 20% of 13cm

Fractions/Decimals/Percentage Problems

1. There are 60 beads in a bag. The beads are red, yellow or blue.
   40% of the beads are blue.
   $\frac{5}{12}$ of the beads are red.
   How many beads are yellow?

2. In the sale, jumpers are on the offer "buy 2, save $\frac{1}{3}$ of the price". Jeans are also currently 30% off.
   Jumpers cost £45 each. Jeans cost £50.
   What is the cost of buying 2 jumpers and 2 pairs of jeans?

Expressing as a %

(a) Write 6 out of 8 marks as a percentage (b) Write 10kg as a percentage of 40kg

(c) Write 22 as a percentage of 40 (d) Write $15 as a percentage of $75

(e) Write £21 as a percentage of £30 (f) Write €18 as a percentage of €40

(g) Write 20p as a percentage of £1 (h) Write 60cm as a percentage of 2m

Comparing %

Andy scored 16/20 on a Physics test and 42/50 on his Biology test.

a) On which test did he get a better percentage? You must show your working.

b) What is his overall percentage?

Proportion

Eg1 Proportion as Fractions

One day, a baby sleeps for 10 hours. Write 10 hours as a fraction of 1 day.

The two times must have the same units. There are 24 hours in 1 day.

$\frac{10}{24}$ — Write a fraction with 10 as the numerator and 24 as the denominator.

$\frac{10}{24} = \frac{5}{12}$ — Divide the numerator and the denominator by 2 to get the fraction in its simplest form.

Eg 2 Proportions as Fractions/Decimals/%

a. 45%

$45\% = \frac{45}{100}$ — Write 45% as a fraction with a denominator of 100

$\frac{45}{100} = \frac{9}{20}$ (÷5 / ÷5) — 5 is a common factor of 45 and 100. Divide both 45 and 100 by 5 to get $\frac{9}{20}$. 9 and 20 do not have a common factor and so $\frac{9}{20}$ is in its simplest form.

$45\% = \frac{45}{100}$ — Write the percentage as a fraction with a denominator of 100

$\frac{45}{100} = 0.45$ — Change the fraction into a decimal.

Eg 3 Ordering F/D/%

Write these numbers in order of size, starting with the smallest.

70%, $\frac{3}{4}$, 0.6, $\frac{2}{3}$

0·70 0·75 0·60 0·66...

0·6, $\frac{2}{3}$, 70%, $\frac{3}{4}$

Eg 4 Best Buy

800 g of crisps costs £2.88
1.3 kg of crisps costs £4.03

Which is the best value for money?
You must show all your working.

2·88 ÷ 800 = 0·0036
4·03 ÷ 1300 = 0·0031

OR

2·88 ÷ 0·8 = 3·6
4·03 ÷ 1·3 = 3·1

1·3 kg for £4·03 is the best value

Proportion

Proportion as Fraction

Express the proportions as a fraction in its simplest form

a 60p and £2

b 6 hours and 1 day

c 36 minutes and 3 hours

d £1.40 and £6

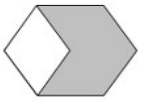
e 27 seconds and 2 minutes

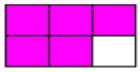
Proportions as Fractions/Decimals/%

Write these proportions as (i) A fraction in its lowest terms
(ii) A percentage

1) Proportion shaded

a) 

b) 

c) 

2a) 9 out of every 20

b) 6 out of every 20

c) 9 parts of every 60

d) 20 out of 8

e) 4200 out of every 1000

Ordering

In each part, write the numbers in order of size. Start with the **smallest** number.

a $\frac{1}{2}$ 53% 0.48

b 0.73 $\frac{3}{4}$ $\frac{7}{10}$ 72%

c $\frac{1}{4}$ 0.2 23%

d 0.44 $\frac{4}{10}$ 48% $\frac{9}{20}$

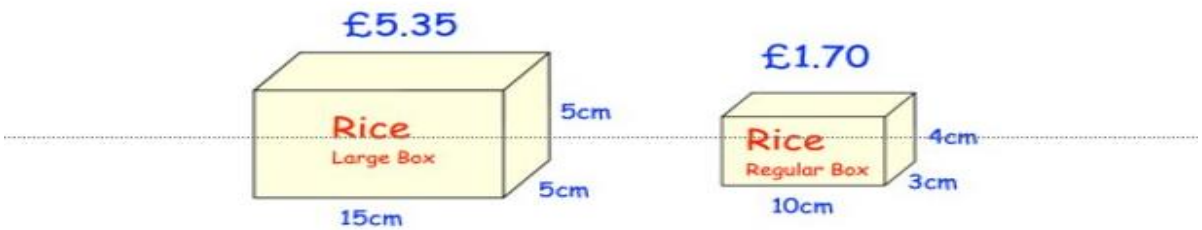
Best Buy

A cereal bar is sold in packs of 4, 6 or 8.

The 4 pack of cereal bars costs £1.80 and it is the least value for money.
The 8 pack of cereal bars cost £3.52 and it is the best value for money.

Work out (a) the lowest price of the 6 pack of cereal bar
(b) the highest price of the 6 pack of cereal bar

A shop sells two different boxes of rice.
Work out which box is best value for money.



Percentage Change

Percentage Increase/Decrease

A concert ticket costs £45 plus a booking fee of 12%.
What is the total price of the ticket?

100% + 12% = 112%

112% of £45

$\frac{112}{100} \times 45 = 50.40$

£50.40

The price of a £7500 car is reduced by 18%.
What is the new, reduced price?

100% − 18% = 82%

$\frac{82}{100} \times 7500 = 6150$

£6150

Steps
1. Is the question a % increase or decrease?
2. Add to or subtract from 100%
3. Divide by 100
4. Multiply by original amount

Simple Interest

Ben borrows £2000 at a simple interest rate of 2.5% per year.
He pays the money back after 3 years.
How much does he have to pay back in total?

10% → £200
5% → £100
2·5% → £50

3 × 50 = £150

£2000 + £150 = £2150

£2150

Change as a Percentage

1 litre of fruit drink costs £1.80 to make.
The fruit drink is sold for £2.25 per litre.
Work out the percentage profit.

Percentage increase:

$\frac{\text{Actual increase}}{\text{Original value}} \times 100$

2·25 − 1·80 = 0·45

$\frac{0.45}{1.80} \times 100 = 25\%$ increase

The usual price of a fridge is £275.
In the sale the fridge is reduced to £242.
What is the percentage reduction?

Percentage decrease:

$\frac{\text{Actual decrease}}{\text{Original value}} \times 100$

275 − 242 = 33

$\frac{33}{275} \times 100 = 12\%$ decrease

Steps
1. Identify whether the question is a % increase or decrease
2. Subtract to find change
3. Express increase/decrease as a fraction of original
4. Multiply by 100

Reverse %

In Italy, Lance spends €2.80 on pizza.
This price includes VAT which is 12% in Italy.

Find the amount of VAT which Lance paid. €0·30

100% + 12% = 112%

÷112 ↓ 112% → €2·80
÷112 ↓ 1% → €0·025
×100 ↓ 100% → €2·50

Steps
1. **Identify whether the problem is a % increase/decrease**
2. **Add/subtract from 100%**
3. **Calculate 1% by dividing**
4. **Calculate 100% by multiplying by 100**

Percentage Change

Percentage Increase/Decrease

(a) Increase 80ml by 9%

(b) Increase 420g by 70%

(c) Decrease 8 by 12%

(d) Decrease £1250 by 38%

(e) Increase 6000km by 23%

(f) Decrease 48GB by 6%

(g) Increase 204 by 98%

(h) Decrease 149mm by 91%

(i) Increase 88 by 185%

Simple Interest

1) Meg has £1200 in her savings account.
The account pays 5% simple interest per year.

How much interest will she earn in 4 years?

2) Dan has £4000 in his savings account.
This account pays 2% interest per year.

How much interest will he earn in 6 years?

3) Chris borrows £6000 at a simple interest rate of 10% per year.
He pays the money back after 4 years.

How much does he pay back in total?

Lisa borrows £3000 at a simple interest rate of 2.5% per year.
She pays the money back after 3 years.

How much does she pay back in total?

Percentage Change

1) In a storm 144 fruit trees were left standing out of 180 fruit trees in an orchard. What is the percentage change in the number of trees?

2) A javelin thrower has best throw of 60m. In the next competition he throws 72m. What is the percentage change of his personal best?

3) A wine manufacturer puts down 250 bottles for 3 years. After 3 years only 220 bottles are intact. What is the percentage change in the number of bottles?

4) A man weighs 65Kg. After two weeks on a diet he weighs 58Kg. What is his percentage change in weight?

Reverse Percentage

1) A camera costs £180 in a 10% sale. What was the pre-sale price?

2) After fuel prices rose by 15%, a family's annual heating bill was £1654. What would the bill have been without the price increase?

3) The cost of a holiday, including VAT at 20% is £540. What is the pre-VAT price?

4) The world's tiger population has decreased by 95% since 1910 and is now believed to be as low as 3200. If these figures are correct, what was the tiger population in 1910?

Probability

We can use a sample space diagram to help determine and list all the possible outcomes of two events.

Two dice are rolled and they are added together. Show all outcomes in a sample space diagram

Face	1	2	3	4	5	6
1	2	3	4	5	6	7
2	3	4	5	6	7	8
3	4	5	6	7	8	9
4	5	6	7	8	9	10
5	6	7	8	9	10	11
6	7	8	9	10	11	12

Work out:

Complimentary not

$P(6) = \frac{5}{36}$

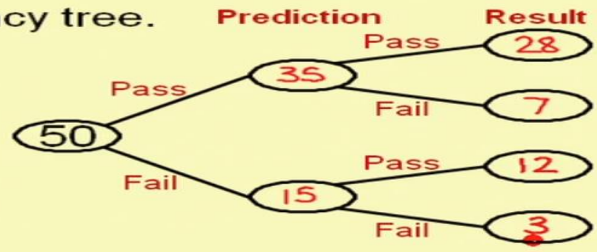
$P'(6) = 1 - P(6) = 1 - \frac{5}{36} = \frac{31}{36}$

Frequency Trees

50 people took a driving test. Before the test, they predicted whether they would pass or fail.

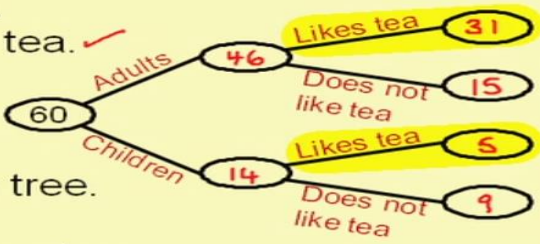
- 35 people predicted they would pass.
- 28 of the people who predicted they would pass did pass.
- 40 people passed altogether.

Complete the frequency tree.



Frequency Trees and Probability

60 people are asked if they like tea.
46 of these people are adults.
36 of the 60 people like tea.
9 of the children do not like tea.



a) Use this information to complete the frequency tree.

b) A person is chosen at random.
Find the probability that this person likes tea. $\frac{36}{60}$

c) One of the people who does like tea is chosen at random.
Find the probability that this person is a child. $\frac{5}{36}$

Probability

Sample Space Diagrams

Rose is playing a game with a fair six sided dice and a fair coin.
She rolls the dice and flips the coin.

If the coin lands on heads, her score is **one less** than the number on the dice.
If the coin lands on tails, her score is **two more** than the number on the dice

(a) Complete the table to show all possible scores

(b) Find the probability of scoring a 0

(c) Find the probability of scoring a 5

(d) Find the probability of scoring a number less than 4

Coin \ Dice	1	2	3	4	5	6
Heads						
Tails						

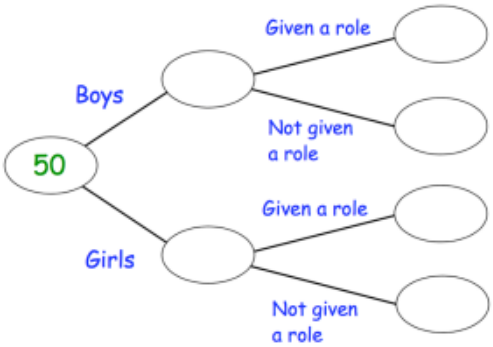
Frequency Trees

50 children audition for the school play.

18 of the children are boys.
15 children were given a role in the play.
8 girls were given a role in the play.

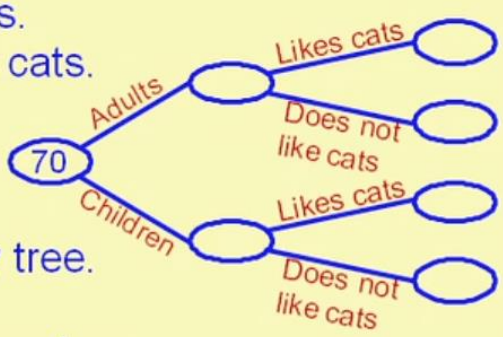
(a) Complete the frequency tree.

(b) What fraction of the boys were given a role in the play?



Frequency Trees and Probability

70 people are asked if they like cats.
52 of these people are adults.
39 of the 70 people like cats.
8 of the children do not like cats.



a) Use this information to complete the frequency tree.

b) A person is chosen at random.
Find the probability that this person likes cats.

c) One of the people who doesn't like cats is chosen at random.
Find the probability that this person is an adult.