National 4
Applications of Mathematics
Revision Notes

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Use this booklet to practise working independently like you will have to in course assessments and the Added Value Unit (AVU).

- Get in the habit of turning to this booklet to refresh your memory.
- If you have forgotten how to do a method, **examples** are given.
- If you have forgotten what a word means, use the **index** (back pages) to look it up.

As you get closer to the final test, you should aim to use this booklet less and less.

This booklet is for:

- Students doing the National 4 Applications of Mathematics course.
- Students studying one or more of the National 4 Applications of Maths units: **Numeracy**, **Geometry and Measures** or **Managing Finance and Statistics.**

This booklet contains:

- The most important facts you need to memorise for National 4 Applications of Mathematics.
- Examples that take you through the most common **routine** questions in each topic.
- Definitions of the key words you need to know.

Use this booklet:

- To refresh your memory of the method you were taught in class when you are stuck on a homework question or a practice test question.
- To memorise key facts when revising for the Added Value Unit.

<u>The key to revising for a maths test is to do questions, not to read notes.</u> **As well as using this booklet, you should also:**

- Revise by working through exercises on topics you need more practice on – such as revision booklets, textbooks, websites, or exercises suggested by your teacher.
- Work through practice tests.
- Ask your teacher when you come across a question you cannot answer.
- Use resources online (a link that can be scanned with a SmartPhone is on the last page)

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Contents

Formula Sheet

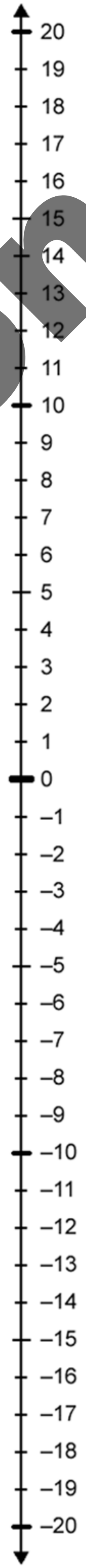
The following formulae are mentioned in these notes and are collected on this page for ease of reference.

Formulae that <u>are given</u> on the formula sheet in the Added Value Unit (or in unit assessments)

Topic	Formula(e)	Page Reference
Circumference of a circle	$C = \pi d$	See page 57
Area of a circle	$A = \pi r^2$	See page 58
Gradient	$\text{Gradient} = \frac{\text{Vertical height}}{\text{Horizontal distance}}$	See page 55
Pythagoras' Theorem	$a^2 + b^2 = c^2$	See page 63

Formulae that are <u>not</u> given in assessments

Topic	Formula(e)	Page Reference
Percentage increase and decrease	$\frac{\text{change}}{\text{original amount}} \times 100$	See page 15
Area of a rectangle	$A = LB$	See page 17
Area of a square	$A = L^2$	See page 17
Area of a triangle	$A = \frac{BH}{2}$ or $A = \frac{1}{2}BH$	See page 17
Volume of a cuboid	$V = LBH$	See page 17
Speed, Distance, Time	$S = \frac{D}{T}$ $T = \frac{D}{S}$ $D = ST$	See page 20
Gross Pay and Net Pay	Net Pay = Gross Pay – Total Deductions	See page 31
Range	$\text{Range} = \text{Highest} - \text{Lowest}$	See page 40
Mean	$\text{Mean} = \frac{\text{Total}}{\text{How many}}$	See page 40
Volume of a prism	$V = Ah$	See page 62



Example 2 – adding and taking away

–6 + 9 = start at –6 and move up 9. Answer: **3**
5 – 7 = start at 5 and move down 7. Answer: **–2**
(–2) – 8 = start at –2 and move down 8. Answer: **–10**

Adding a negative number is the same as taking away. When an addition and a subtraction sign are written next to each other, you can "ignore" the addition sign.

Example 3– adding a negative

2 + (–6) = 2 – 6 = start at 2 and move down 6. Answer: **–4**
(–1) + (–7) = (–1) – 7 = start at –1 and move down 7. Answer: **–8**

Taking away a negative number becomes an addition. When two negative signs are written next to each other without a number in between, they become an add sign.

This can be thought of as "**taking away a negative becomes an add**"

Example 4 – taking away a negative

5 – (–2) = 5 + 2 = **7**
(–7) – (–2) = (–7) + 2 = start at –7 and move up 2. Answer: **–5**

Multiplying and Dividing Negative Numbers (Integers)

Multiplying and dividing integers have *completely different* rules to adding and taking away. To multiply and divide, you do the sum normally (as if there were no negative signs there), and then you decide whether your answer needs to be negative or positive.

When multiplying and dividing:

- If none of the numbers are negative, then the answer is **positive**.
- If one of the numbers is negative, then the answer is **negative**.
- If two of the numbers are negative, then the answer is **positive**.
- If three of the numbers are negative, then the answer is **negative**.

and so on…

In short, the rules are:

+ multiplied by **+** gives you **+**
– multiplied by **+** gives you **–**
+ multiplied by **–** gives you **–**
– multiplied by **–** gives you **+**

+ divided by **+** gives you **+**
– divided by **+** gives you **–**
+ divided by **–** gives you **–**
– divided by **–** gives you **+**

Example 1 – multiplication

(–5) × 4 = **–20**
60 × (–2) = **–120**

*If **one** of the numbers is negative, then the answer is **negative**.*

(–3) × (–10) = **+30 (or just 30)**
(–2) × 3 × (–4) = **24**

*If **two** of the numbers are negative, then the answer is **positive**.*

(–2) × (– 3) × (–4) = **–24**

*If **three** of the numbers are negative, then the answer is **negative**.*

In particular, if you square a negative number, **the answer always has to be positive**, because you are multiplying two negative numbers.

Example 2 – squaring

$(-6)^2 = \quad (-6) \times (-6) = \quad 36$

$(-10)^2 = \quad (-10) \times (-10) = \quad 100$

*If **two** of the numbers are negative, then the answer is **positive**.*

Example 3 – dividing

$(-28) \div 4 = \quad -7$

$50 \div (-5) = \quad -10$

*If **one** of the numbers is negative, then the answer is **negative**.*

$(-80) \div (-10) = \quad +8$ (or just 8)

*If **two** of the numbers are negative, then the answer is **positive**.*

Examples 1 and 2

Calculate 75% of 480cm. **Calculate $33\frac{1}{3}$% of £330.**

Solution

75% of 480cm

= $\frac{3}{4}$ of 480cm

= 480 ÷ 4 × 3 = 360cm

$33\frac{1}{3}$% of £330

= $\frac{1}{3}$ of £330

= £330 ÷ 3 × 1 = £110

Other percentages can be worked out without a calculator by finding 1% or 10% first

For example to find 30%: find 10% first, then multiply the answer by 3.
To find 4%: find 1% first then multiply the answer by 4.

Examples 3 and 4

Calculate 40% of £120. **Calculate 7% of 3000kg.**

Solution

10% of £120 = £12
so 40% of £120 = 12 × 4 = £48

1% of 3000kg = 30kg
so 7% of 3000kg = 30 × 7 = 210kg

Percentages with a Calculator

For every question, there are two ways of doing it. Use the one you are happiest with.

Question	Method 1 Divide and Multiply	Method 2 Decimal	Answer
27% of £360	360 ÷ 100 × 27	0·27 × 360	**£97·20**
3% of £250	250 ÷ 100 × 3	0·03 × 250	**£7·50**
17·5% of £4200	4200 ÷ 100 × 17·5	0·175 × 4200	**£735**
4·2% of £360	360 ÷ 100 × 4·2	0·042 × 360	**£15·12**

Example

A car is normally priced at £8800. In a sale, the price has been reduced by 12%. Calculate the new price of the car.

Solution

12% of £8800 = 0·12 × 8800 [or 8800 ÷ 100 × 12] = £1056
New price = 8800 – 1056 = £7744.

Calculating the Percentage Increase or Decrease

To find the percentage increase or decrease, we use the method for changing fractions to percentages outlined on page 14.

In these questions, we work out the percentage of the **original** amount. The steps are:

Graphs, Charts and Tables

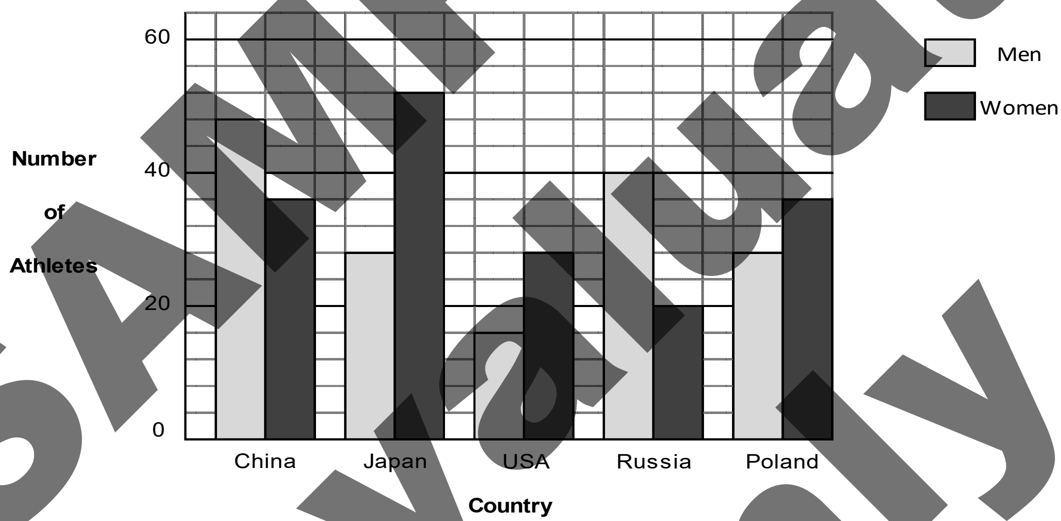
Interpreting and Comparing Graphs

To pass the National 4 numeracy unit, you need to be able to obtain information from at least two different types of diagram. These could include any sort of graph, chart or table – including a frequency table, a table of information, a bar chart, line graph, pie chart (see page 23), stem and leaf diagram (see page 24) or scatter graph (see page 43).

For the National 4 Applications of Mathematics Added Value Unit you may be required to compare information and calculate differences from a graph or graphs. This is most likely to involve either a **bar graph** or a **pie chart**, though it could involve other graphs too.

Example 1 – Bar Chart, sample Added Value Unit question

The graph shows the number of athletes from five countries taking part in an international Sports Tournament.



(a) $\frac{2}{3}$ **of the male athletes from China were swimmers. Calculate the number of swimmers.**

(b) How many more athletes were from Japan compared to the USA?

Solution

(a) The graph tells us that there were 48 male athletes from China in total.

To find $\frac{2}{3}$ we divide by 3 and multiply by 2:

$48 \div 3 \times 2 =$ 32 athletes.

(b) The graph shows that there were 28 men and 52 women from Japan. This is a total of 80 athletes.

The graph also shows that there were 16 men and 28 women from the USA. This is a total of 44 athletes.

80 – 44 = 36, so there were 36 more athletes from Japan compared to the USA.

Overtime

Definitions:
- A worker's **basic hours** are the hours that they *must* work each week (or each month etc.). *e.g. John works a basic 35 hour week.*
- **Overtime** hours are any extra hours that a worker works in addition to their basic hours. *e.g. Jacquie works a basic 28 hour week. If Jackie works 31 hours in a week, then she has done **3 hours** of overtime.*

You get paid more for each hour of overtime you work than you do for your basic hours. There are two common ways of doing this:
- Double time – where the hourly wage is doubled for overtime hours.
- Time-and-a-half – where you get half as much again for overtime hours.

To work out overtime, the calculation is:
- … × 2 (for **double time**)
- … × 1·5 (for **time-and-a-half**)

Example 3 – overtime

Janet works part time in a chemist and works a basic 14-hour week.
Janet is paid a basic rate of £5·30 per hour, and gets time-and-a-half for overtime.
Calculate Janet's gross pay in a week where she works 17 hours.

Solution

Janet works 14 basic hours, and 3 overtime hours
Basic hours: 14 × £5·30 = £74·20
Overtime: 3 × £5·30 × 1·5 = £23·85
Gross pay: £74·20 + £23·85 = £98·05

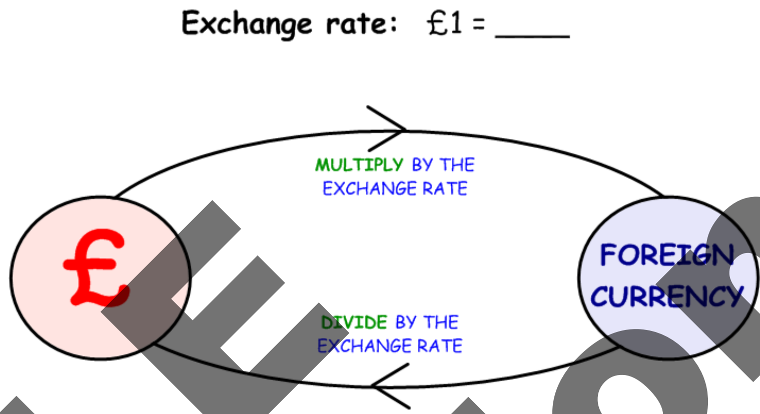
Example 4 – completing a pay slip given a mixture of information

Jen works in a newsagent. She gets paid a basic wage of £6·30 an hour.
When she works overtime, she gets double time.
In a particular week:
- **Jen works 15 hours for basic pay.**
- **Jen works 7 hours overtime.**
- **Jen pays 20% of her gross pay as tax.**
- **Jen pays 6% of her gross pay as National Insurance (NI).**

Complete the payslip shown to calculate Jen's net pay for that week.

Payslip			
Name	Employee No.	Week	NI Number
Jen	0034	50	HT867473A
Basic Pay	Overtime Pay		**Gross Pay**
		-	
Tax	National Insurance	Pension	**Total Deductions**
		£0·00	
			Net Pay

Currency and Exchange Rates



To convert money from one currency to another, we need an exchange rate.

In all questions at National 4 level, the exchange rate will be expressed in terms of pounds (e.g. £1 = ____).

In these notes, we will use the term 'foreign money' to refer to any currency other than pounds.

<u>Example 1 – changing from pounds into foreign currency</u>

Janet changes £250 into Euros. The exchange rate is £1 = €1·13. Calculate how many Euros Janet will get.

Solution

To change from pounds into foreign money, we **multiply** by the exchange rate:

250 × 1·13 = 282·5 = <u>€282·50</u> (units and two decimal places are essential)

<u>Example 2 – changing back into pounds</u>

Harry went to the USA with $1500. Whilst in the USA, he spent $700.

When returning from the USA, Harry changes his money back into pounds. The exchange rate is £1 = $1·27. Calculate how many pounds Harry will receive.

Solution

Harry is left with $1500 – $700 = $800. We need to change $800 to pounds.

To change from foreign money back into pounds, we **divide** by the exchange rate:

800 ÷ 1·27 = 629·921…. = <u>£629·92</u> (units and two decimal places are essential)

Some companies charge **commission** when they convert money. This is usually a percentage of the money which they keep as their payment.

<u>Example 3 – with commission</u>

Maisie is changing £800 into Japanese Yen at the bank. The exchange rate is £1 = 138 Yen (¥). The bank charge 2% commission. Calculate how many Yen Maisie receives.

Solution

To change money from pounds into foreign money, we **multiply** by the exchange rate:

800 × 138 = 110 400 Yen

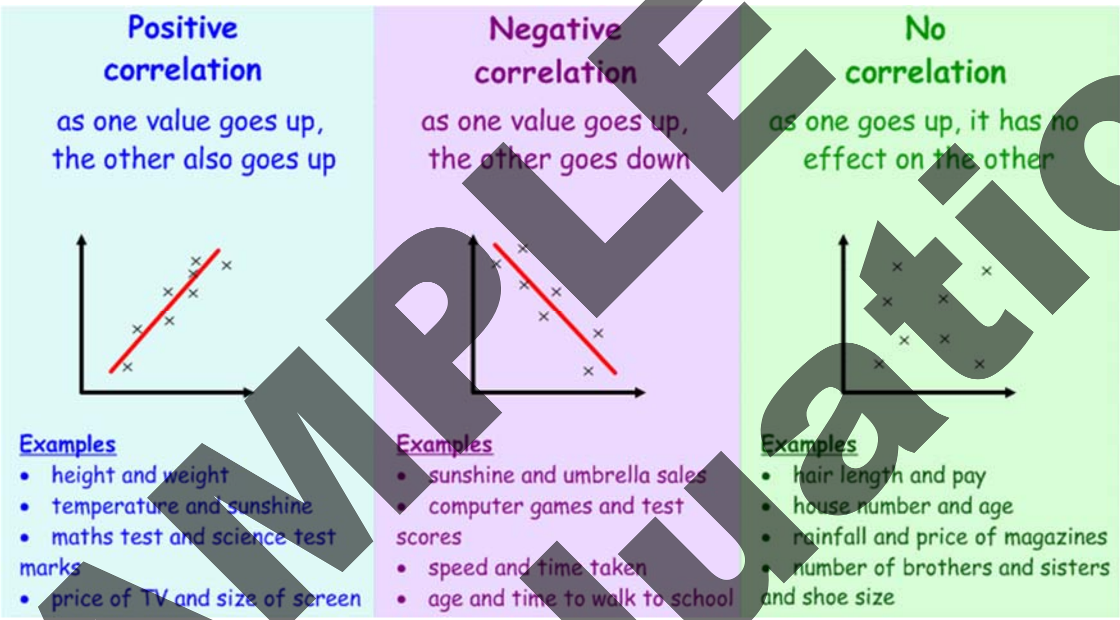
2% of 110 400 = 0·02 × 110 400 = 2208, so the bank's commission is 2208 Yen.

Maisie receives 110 400 – 2208 = <u>108192 Yen.</u>

Scatter Graphs

A scatter graph displays two sets of linked data on one diagram.

Definition: the **correlation** between two data set refers to the relationship (if any) between the numbers. A scatter graph is good for showing correlation. Correlation can be **positive** (going up), **negative** (going down), or **none**.



Definition: a **line of best fit** is line drawn on to a scatter graph that shows the correlation of the graph. The straight lines drawn above for positive and negative correlation are examples of lines of best fit.

The line of best fit should go:

- go through the middle of the points, with roughly the same number of points above and below the line
- in the same direction that the points are laid out on the page. **Do not "join the dots"**.
- The line of best fit does not have to go through the origin.

Tip: Try and make sure there are roughly the same number of points 'above' and 'below' the line. If there are significantly more points on one side of the line, you won't be able to get the mark.

You will *always* be asked to draw the line of best fit in a scatter graph question in a maths exam. Once you have drawn the line, you will always be asked to *use it*.

Example 1

A gift shop records the temperature each day for 13 days. They also record how many scarves they sell each day. The results are shown in the table. Construct a scatter graph to display this information.

Temperature (°C)	5	4	3	5	7	5	7	1	1	4	2	0
Scarf Sales	3	6	5	4	3	2	0	8	7	4	6	9

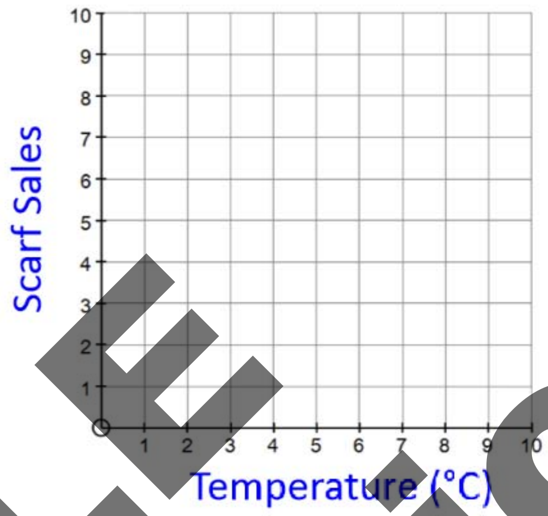
Solution

Step one – draw your axes.

It is important to:

- o Label the axes.
- o Ensure the numbers go up in equal amounts.

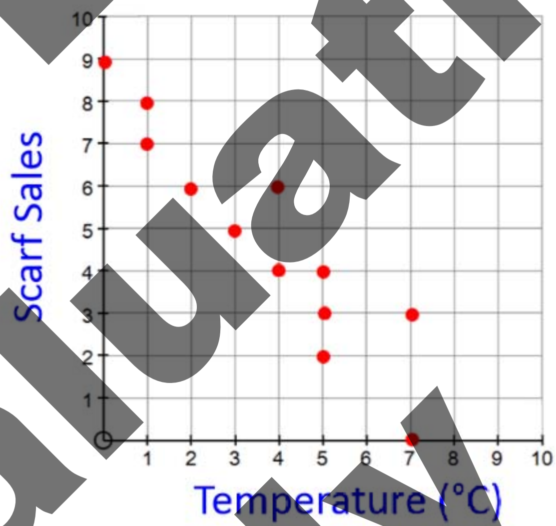
One possible set of axes is shown on the right.



Step two – plot the points.

A possible finished graph is shown on the right.

From this graph, we can see there is **negative correlation** between temperature and scarf sales.

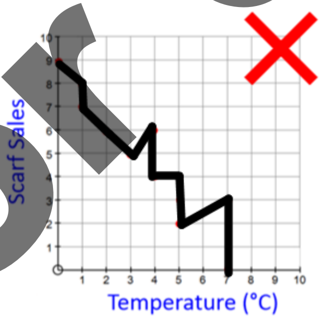


Example 2

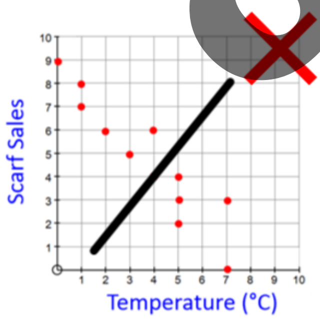
Draw a line of best fit on the scatter graph from example 1.

Solution

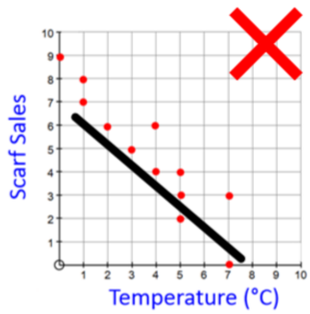
The three lines of best fit below would be marked **wrong**:



Joining the dots: WRONG



Not in same direction as the points: WRONG

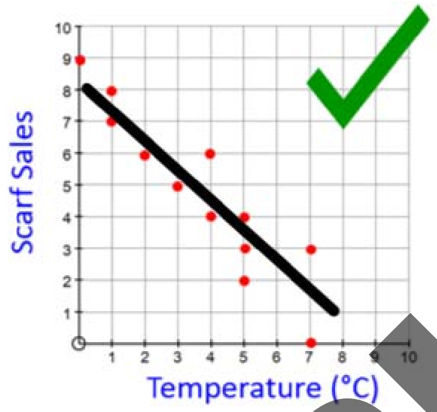


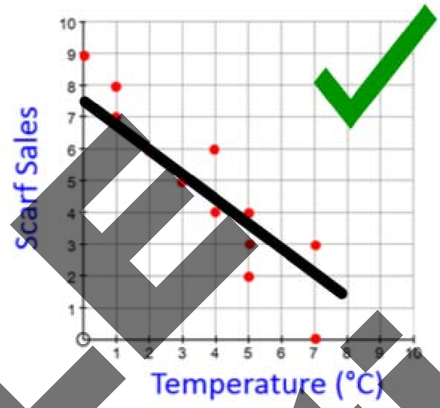
Not through the middle of points (too low): WRONG

(continued on next page…)

(Example 2 continued)

Any of the two lines of best fit below should be marked **correct** as they go roughly through the middle of the points, and roughly in the same direction as the points. There are other possible correct lines as well.





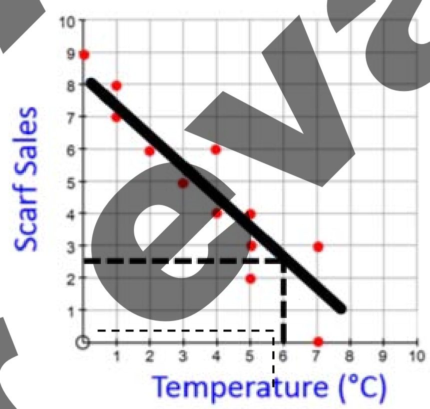
Example 3

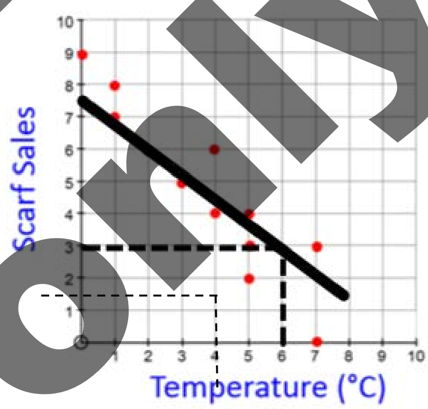
On the next day, the temperature is 6°C. Using your line of best fit, estimate how many scarves the shop will sell.

Solution

The key words here are *using your line of best fit*. If your answer matches with your line, you get the mark. If it doesn't match with your line, you don't get any marks: Simple as that.

The correct answer will depend on your graph. You need to draw lines on your graph at 6°C, and to see where they meet the line of best fit. For the two examples above, this would look like this:





If your line of best fit was the one on the left, your answer would be 2·5, which you could then round to either 2 or 3 scarves. If your line of best fit was the one on the right, your answer would be 3 scarves.

It does not matter that these answers are different: remember the question only asked for an *estimate*. The important thing is that it matches your line of best fit.

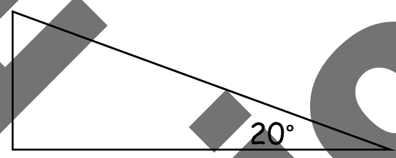
Solution

The scale is 1cm = 20m. The scale factor in this question is **20**.

The real-life length of the horizontal line is 100m.
To calculate the distance on the page, we <u>divide</u> by the scale factor and change the units of the answer to centimetres:

100 ÷ 20 = <u>5cm</u>. So we draw a horizontal line 5cm long.

Now we draw a 20° angle at the right-hand end of the horizontal line using a protractor, and a 90° angle at the left-hand end. (note – the actual diagram here will not be to scale)



Now to work out the real-life height of the oil well, we measure the vertical line in our scale drawing. If our diagram is correct, we should find it is 1·8cm tall.
To calculate the real-life height, we <u>multiply</u> by the scale factor and change the units to metres:

1·8 × 20 = 36, so the real-life height is <u>36m</u>.

For unit assessments, you need to be able to plot a **navigation** course showing a journey when given distances and three-figure bearings. A three-figure bearing is a way to describe a direction more accurately than a compass.

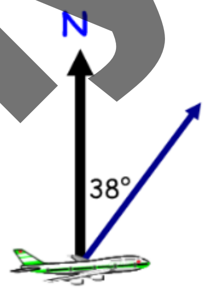
Always start from North and move in a clockwise direction. You must also use three figures, so we write 085° instead of 85°, and we write 002° instead of 2°.

<u>Example 2 – bearings</u>

What bearing is the plane in the diagram flying on?

Solution

The plane is flying on a bearing 038°.



When drawing your own navigation course you need to use the scale to work out how long the lines in your diagram must be.

<u>Example 3 – drawing a navigation course</u>

Some soldiers are marching across the countryside. From the start, they march:

- **2400m on a bearing of 040° to reach a lake;**
- **800m on a bearing of 200° to reach a hut.**

Using the scale 1cm = 200m, construct a scale drawing of the route.

Solution

The scale is 1cm = 200m. The scale factor in this question is **200**.

(continued on next page)

(Example 3 continued)

Task One: calculate the lengths needed for the drawing (the angles do not change).

To calculate the distance on the page, we divide by the scale factor and change the units of the answer to centimetres:

1st leg of journey:

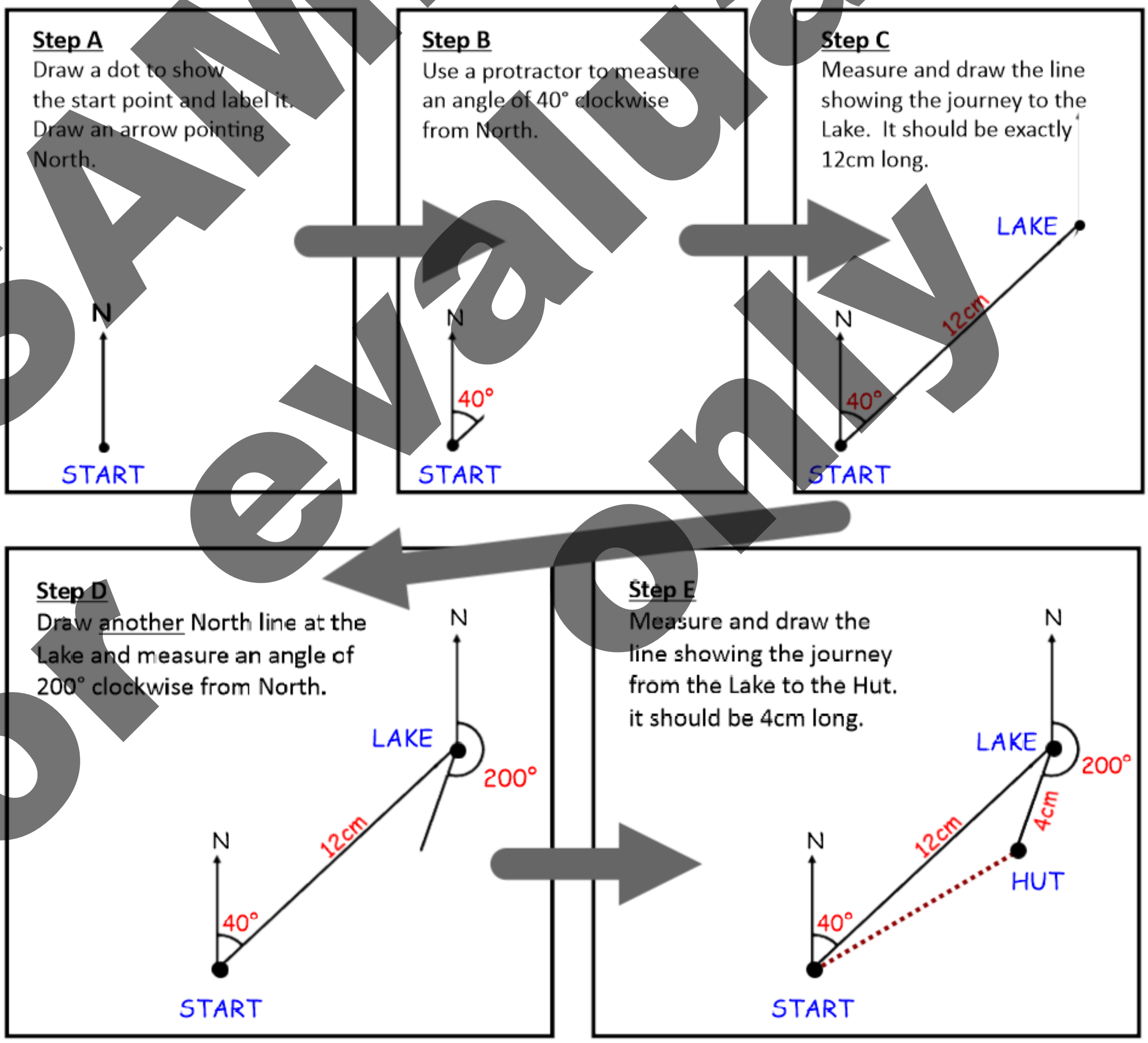
2400 ÷ 200 = 12, *so we will draw a line **12cm** long on a bearing of **040°** (40° clockwise from North).*

2nd leg of journey:

800 ÷ 200 = 4, *so we will draw a line **4cm** long on a bearing of **200°** (200° clockwise from North).*

Task Two: draw your diagram accurately.

The steps involved in drawing the route are outlined here. The finished diagram should look something like the **Step E** picture. Always annotate (label) your diagram thoroughly with all lengths, angles and place names.



Container Packing

You need to be able to work out how to pack smaller three-dimensional objects inside larger containers. When doing so, we must bear several factors in mind:

- It is *essential* that none of the edges of the smaller objects end up being too big for the larger container.
- It is OK to have extra space left over. However, we want as little unused space as possible as unused space could result in wasted money to a business.
- Some objects may have to be stacked a certain way up so that they do not break.

To find out how many objects fit in, we need to do a division sum with the lengths of the objects and the length of the container. It is not possible to have a fraction of an object so if the answer is a decimal/fraction we must round **down** (never up) to the nearest whole number.

Example 1

A tin of beans has diameter 8·5cm.

A supermarket shelf measures 120cm. Calculate the largest number of tins that can be fitted in one row on the shelf?

Solution

120 ÷ 8·5 = 14·111, so 14 tins can be fitted in a row.

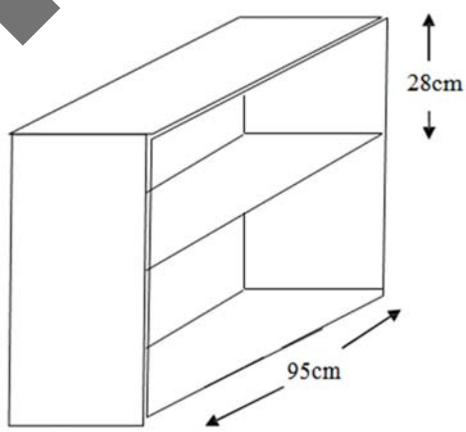
There are two types of question you are likely to be asked:

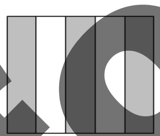
- Type 1: **how many** objects can you fit in? For example you might be asked how many DVDs of a given size could fit on a bookshelf; or how many containers could fit inside a lorry.
- Type 2: **find a way** to arrange differently sized items. For example you might be shown the sizes of a number of different sized packages boxes and asked to find a way of arranging them inside another, larger, box so that they all fit.

Example 2 – how many

Books are 3cm wide and 22cm tall. The books need to be stacked into a bookcase.

The diagram on the right shows the size of the bookcase. It has two shelves.





(a) If books are stacked vertically as shown in the picture on the left, calculate how many books will fit on the shelf.

(b) If books are stacked flat as shown in the picture on the left, calculate how man books will fit on the shelf.

Circumference of a Circle

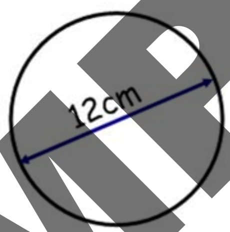
Definitions:

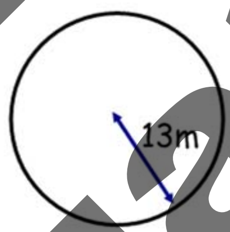
- the **diameter** of a circle is the length all the way across a circle, passing through the centre.
- the **radius** is half of the diameter.
- the **circumference** is the curved length around the outside of a circle. It is a special name for the perimeter of a circle.

This formula <u>is</u> given on the formula sheet for unit assessments
Circumference of a circle: $C = \pi d$

<u>Example 2 – circumference of a circle</u>

Calculate the circumferences of these two circles:





Solutions

The *diameter* is 12cm, so d = 12

$$\begin{aligned} C &= \pi d \\ &= \pi \times 12 \quad \text{(or } 3{\cdot}14 \times 12\text{)} \\ &= 37{\cdot}69911184... \\ &= \underline{37{\cdot}7\text{cm}} \text{ (1 d.p.)} \end{aligned}$$

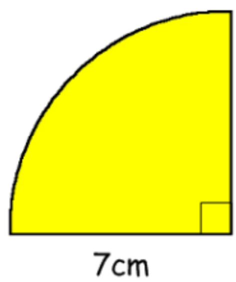
In this circle, the *radius* is 13m so the diameter is 26m, i.e. d = 26

$$\begin{aligned} C &= \pi d \\ &= \pi \times 26 \quad \text{(or } 3{\cdot}14 \times 26\text{)} \\ &= 81{\cdot}68140899... \\ &= \underline{81{\cdot}68\text{m}} \text{ (2 d.p.)} \end{aligned}$$

You may come across more difficult examples that involve quarter and half circles, the next example ask you to calculate the **perimeter** of the shapes. The word 'circumference' refers only to the curved length. Therefore, to work out the perimeter, you also need to add on any straight lengths.

<u>Example 3 – perimeter of a circle</u>

Calculate the perimeter of the quarter-circle shown.



Solution

7cm is the radius, so the diameter is 14cm, i.e. d = 14.

The shape is a quarter circle, so we divide the circumference by 4.

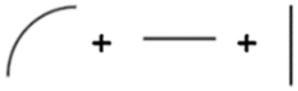
Step one: calculate the circumference:

$$\begin{aligned} C &= \pi d \div 4 \\ &= \pi \times 14 \div 4 \quad \text{(or } 3{\cdot}14 \times 14 \div 4\text{)} \\ &= 10{\cdot}9955... \\ &= \underline{11{\cdot}0\text{cm}} \text{ (1 d.p.)} \end{aligned}$$

(continued on the next page…)

(Example 3 continued)

Step two: calculate the perimeter by adding on the straight lengths

Perimeter = 

Perimeter = 11·0 + 7 + 7 = <u>25·0cm</u>

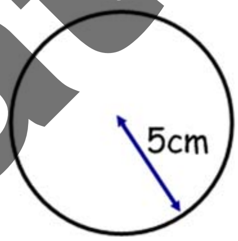
Area of a Circle

Definition: the **area** of a 2d shape is a measure of the amount of space inside it.

This formula <u>is</u> given on the formula sheet for unit assessments
Area of a circle: $A = \pi r^2$

<u>Example 1 – radius</u>

Calculate the area of this circle.



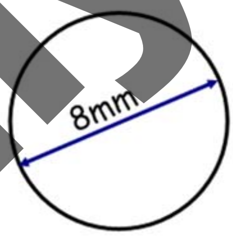
Solution

The radius of this circle is 5cm, so r = 5.

$$\begin{aligned} A &= \pi r^2 \\ &= \pi \times 5^2 \quad (\text{or } 3\cdot 14 \times 5^2) \\ &= 78\cdot 53981634... \\ &= \underline{78\cdot 5\text{cm}^2} \ (1 \text{ d.p.}) \end{aligned}$$

<u>Example 2 – diameter</u>

Calculate the area of this circle.



Solution

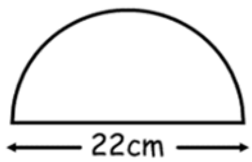
8mm is the diameter, so the radius is 4mm, or r = 4.

$$\begin{aligned} A &= \pi r^2 \\ &= \pi \times 4^2 \quad (\text{or } 3\cdot 14 \times 4^2) \\ &= 50\cdot 26548... \\ &= \underline{50\cdot 3\text{mm}^2} \ (1 \text{ d.p.}) \end{aligned}$$

Definition: a semicircle is half of a circle.

<u>Example 3 – semicircle</u>

Calculate the area of this semicircle.



Solution

22cm in this diagram is the *diameter*. This means that the radius is 11cm or r = 11cm.

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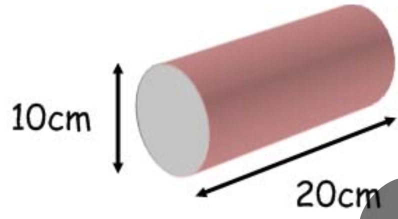
Example 2 – cylinder

Calculate the volume of the cylinder shown.



Solution

The height of this prism is the distance from one (circular) end to the other. In this cylinder, the height is 20cm.

Step 1: Work out the area of the cross-section

In this shape, the cross-section is a circle. The formula for the area of a circle is $A = \pi r^2$.

Important: you will use a different formula in each question, depending on whether the cross section is a rectangle, square, triangle, circle, semicircle etc.

Diameter is 10cm so radius is 5.

$$\begin{aligned} A &= \pi r^2 \\ &= \pi \times 5^2 \\ &= 78 \cdot 539 \ldots \text{cm}^2 \end{aligned}$$

Step 2: Use the formula for volume of a prism:

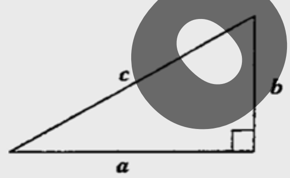
$$\begin{aligned} V &= Ah \\ &= 78 \cdot 539 \times 20 \\ &= 1570 \cdot 796 \\ &= \underline{1570 \cdot 8\text{cm}^3} \end{aligned}$$

Pythagoras' Theorem

When you know the length of any two sides of a right-angled triangle you can use Pythagoras' Theorem (usually just known as **Pythagoras**) to calculate the length of the third side without measuring.

This formula is given on the formula sheet for assessments

Theorem of Pythagoras:



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

Definition: the hypotenuse is the longest side in a right-angled triangle. In the diagram above, the hypotenuse is *c*. The hypotenuse is always opposite the right angle.

There are three steps to any Pythagoras question:

Step One: square the length of the two given sides.

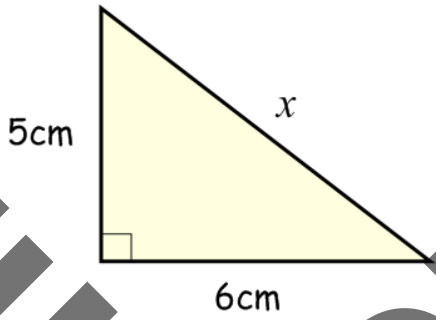
Step Two: either add or take away:

- To find the length of the longest side (hypotenuse), **add** the squared numbers.
- To find the length of a shorter side, **take away** the squared numbers.

Step Three: square root.

Example 1 – finding the length of the hypotenuse

Calculate the length of *x* in this triangle.
Do not use a scale drawing.



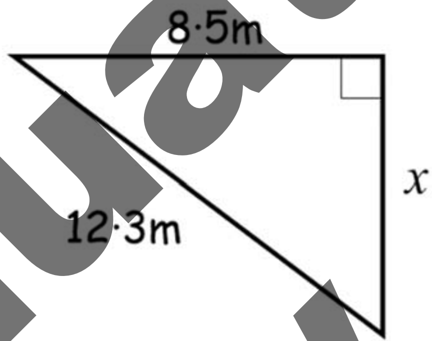
Solution

We are finding the length of *x*.
x is the hypotenuse, so we **add**:

$$x^2 = 5^2 + 6^2$$
$$x^2 = 61$$
$$x = \sqrt{61}$$
$$x = 7\cdot81024....$$
$$x = \underline{7\cdot81\text{cm}} \text{ (2 d.p.)}$$

Example 2 – finding the length of a shorter side

Calculate *x*, correct to 1 decimal place.
Do not use a scale drawing.



Solution

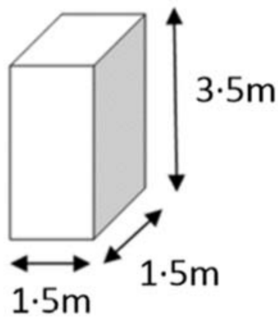
We are finding the length of *x*.
x is a smaller side, so we **take away**.

$$x^2 = 12\cdot3^2 - 8\cdot5^2$$
$$x^2 = 79\cdot04$$
$$x = \sqrt{79\cdot04}$$
$$x = 8\cdot8904....$$
$$x = \underline{8\cdot9\text{cm}} \text{ (1 d.p.)}$$

Enlargement and Reduction by a Scale Factor

Example 1

The diagram shows a cuboid



(a) Calculate the volume of the cuboid.
(b) Each side of the cuboid is enlarged by a scale factor of 3. Calculate the new volume of the enlarged cuboid.

Solution

(a) We find volume using *V* = *LBH*

$$V = LBH$$
$$= 1\cdot5 \times 1\cdot5 \times 3\cdot5$$
$$= 7\cdot875\text{m}^3$$

Index of Key Words

All information in this revision guide has been prepared in best faith, with thorough reference to the documents provided by the SQA, including the course arrangements, course and unit support notes, exam specification, specimen question paper and unit assessments.

These notes will be updated as and when new information becomes available.

We try our hardest to ensure these notes are accurate, but despite our best efforts, mistakes sometimes appear. If you discover any mistakes in these notes, please email us at david@dynamicmaths.co.uk.
An updated copy of the notes will be provided free of charge!
We would like to hear any suggestions you may have for improving our notes.

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