| GCSE - **Numeracy and Mathematics** | **Tier:** Intermediate | **Grade:** D/C | |
|---|---|---|---|
| **Topic:** Bills | | | |

## Starter

1) 5% of £135 =

2) 7.5% of £185.50 =

3) Write the following in £ to the nearest penny (2 decimal places)
a)      18070p      = £
b)      23051.8p      = £

## Top Tips!

- The difference between meter readings show how much gas/electricity has been used during the period
- Standing/service charge are added to cover extra costs
- People sometimes pay by direct debit and this shows up as credit **(cr)**. If you owe money, this is called debit **(dr)** and must be added to the bill.

## Skills:

| Present meter reading | 8700 |
|---|---|
| Previous meter reading | 7250 |
| Charge per unit | 3p per unit |
| Service charge | £12 |
| VAT | 5% |

Step 1 (units used):

Step 2 (cost of the units):

Step 3 (total before VAT):

Step 4 (VAT):

Step 5 (Total with VAT):

## Examination Question:

**2015 November Linear P1 Higher Qu 4**

*You will be assessed on the quality of your written communication in this question.*
The cost of buying electricity from North Electricity is as follows:
• Standing charge 28p per day
• Energy charge 14p per kWh used
• VAT 5% payable on total charges
Evan uses 850 kWh of electricity during a period of 90 days.
Calculate Evan's total bill for buying electricity from North Electricity.                    [9]

## Assessment for Learning

## Video / QR code

| GCSE - Numeracy and Mathematics | Tier: Intermediate | Grade: |
|---|---|---|
| Topic: Wages | | C |

## Starter:

1) 20% of £13500 =

2) 45% of £37255 =

## Top Tips!

- Everyone is allowed to earn a specific amount of money before you start paying tax. This amount is called a personal allowance
- If you have to pay higher rate tax (40%), you don't have to pay this on all of your earnings!
- Gross income is how much you earn before paying taxes
- Net income is how much you actually receive after deductions

## Skills:

Jack employs two workers, Siân and Dan.
He pays each of them as follows:
• £3.75 each day they work, for checking the hedges and fences on the way to work
• £16.25 per hour when working with the animals
• £18.50 per hour when working with equipment, such as fork lift trucks and tractors.
Siân works 3 days a week.
Last week she spent 4 hours each day working with animals and 2 hours each day using the fork lift truck.
How much was Siân paid last week?
[3]

## Examination Question:

**2014 June – Linear P2 Q5**

Claudia was given the following information.

UK Income Tax
April 2013 to April 2014
taxable income = gross income – personal allowance
• personal allowance is £9205
• basic rate of tax: 20% on the first £32255 of taxable income
• higher rate tax: 40% is payable on all taxable income over £32255

During the tax year 2013 to 2014, Claudia's gross income was £52250.
Calculate the total amount of tax that Claudia should pay.
You must show all your working.                                    [6]

## Assessment for Learning

| GCSE - Numeracy and Mathematics | Tier: Intermediate | Grade: | |
|---|---|---|---|
| Topic: Timetables | | E/D | GwE |

## Starter

1) Convert to the 24 hour clock
   4:37pm :
   12:20am :
2) Convert to the 12 hour clock
   22:13 :
   03:47

## Top Tips!

- Remember to read down the columns to see the timings of a specific bus or train
- Remember that bus and train timetables use the 24 hour clock (i.e. 4 digits and no am/pm)
- You can't add/subtract time by placing them underneath each other
- Learn to use the time button on the calculator

## Skills:

1) A train departs Bangor at 10:47 and takes 4 hours 38 minutes to arrive in Cardiff. When does the train arrive in Cardiff?

2) The table shows part of a timetable for trains from Holyhead to Wrexham:

| Caergybi | 06:17 | 07:45 | 08:57 |
|---|---|---|---|
| Wrecsam | 07:58 | 09:20 | 10:36 |

When does the train that completes the journey quickest depart from Holyhead?

## Examination Question:

**2015 January Link - Applications U1 Higher Qu 1**

Berlin's main railway station is known as the Hauptbahnhof. Bellevue and Wildau are two railway stations in opposite directions from the Hauptbahnhof.
On a particular day,
• trains leave the Hauptbahnhof to Bellevue every 14 minutes
• trains leave the Hauptbahnhof to Wildau every 12 minutes.
A train to Bellevue and a train to Wildau both leave the Hauptbahnhof at 10:00.
When will a train to Bellevue and a train to Wildau next leave the Hauptbahnhof at the
same time? [4]

## Assessment for Learning

## Video / QR code

| GCSE - Numeracy and Mathematics | Tier:Intermediate | Grade: | |
|---|---|---|---|
| Topic: Time Zones | | E/D | |

## Starter

How many seconds are there in one day?

## Top Tips!

- So that 'midday' is close to the middle of the day, the world is divided into different time zones
- Ensure you work systematically and calculate the time of each event in both time zones e.g. in a table

| | Manchester | New York |
|---|---|---|
| Flight departs | 07:23 | 02:23 |
| Flight arrives | 14:14 | 09:14 |

## Skills:

1) The rugby World Cup final is broadcast live across the world. One particular year it was held in Wales and the kickoff was 4pm local time. Where Beth lives, it is 17 hours behind Wales. When did the kickoff occur in her local time?

2) A plane left airport A at 8:30pm on Tuesday and landed at airport B at 9pm (local time) on the same day.
If airport B is 19 hours behind airport A, how long did the trip take?

## Examination Questions:

**2013 Summer Linear P2 Higher Qu 3 (b)**

Miriam knows that when it is 1p.m. in London it is 6p.m. local time in Karachi, Pakistan.
Miriam is booked onto a flight leaving London on Tuesday at 13:50.
The flight time is 7 hours 51 minutes.
On which day and at what local time should Miriam land in Karachi? [4]

**2012 Winter Unitised U1 Higher Qu 6**

Helen and James are travelling by plane from London to Los Angeles. They see the following information when they arrive at the airport on Tuesday.

| Current day and time | |
|---|---|
| London | Los Angeles |
| Tuesday 15:40 | Tuesday 07:40 |

Their flight leaves in two and a half hours' time. The flight time between London and Los Angeles is 11 hours and 20 minutes. Give the time and the day in Los Angeles when they land. [4]
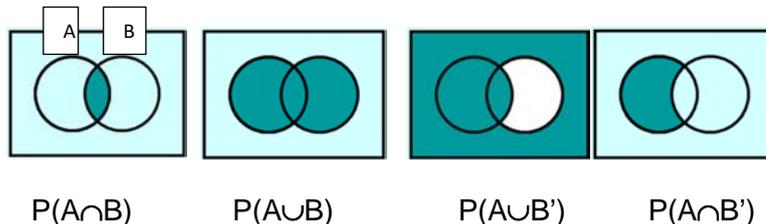
## Assessment for Learning

## Video / QR code

| GCSE - Numeracy and Mathematics | Tier: Intermediate | Grade: |
|---|---|---|
| Topic: Venn Diagram | | E/D/C |

## Starter

Write 180 as a product of prime numbers in index form:

## Top Tips!

Learn to use Venn diagram notation

A    B

P(A∩B)        P(A∪B)        P(A∪B')        P(A∩B')

## Skills:

**1)** If $36 = 2 \times 3^2$ and $48 = 2^4 \times 3$

36        48
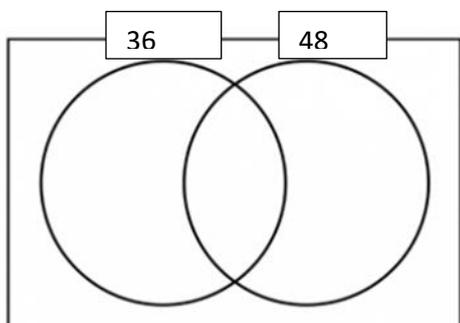
Label and fill the diagram and use the information to calculate the highest common factor and least common multiple of 36 and 48.

HCF =                    LCM=

**2)** Place all the numbers from 12 to 16 in the Venn diagram where:
- M are multiples of 2
- P are multiples of 3
- S are prime numbers

M

S        P
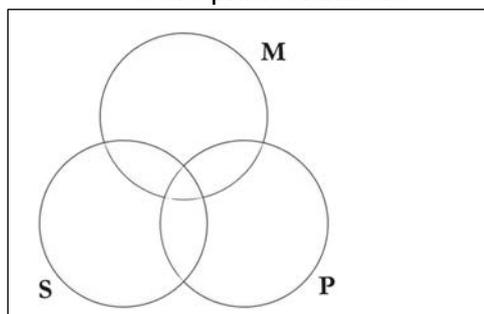
## Examination Question:

**2014 January Link - Methods U1 Higher Qu 5**

The universal set, ε = {22, 23, 24, 25, 26, 27, 28, 29, 30}.
Within this universal set ε,
• set *A* is the multiples of 2
• set *B* is the multiples of 4
• set *C* is the multiples of 5
    *(a)* Complete the Venn diagram. [3]
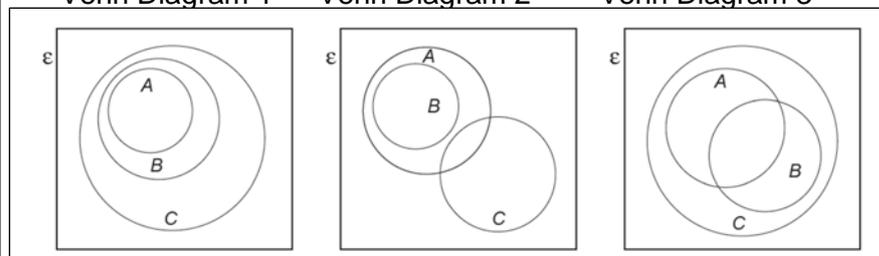
A        B

C
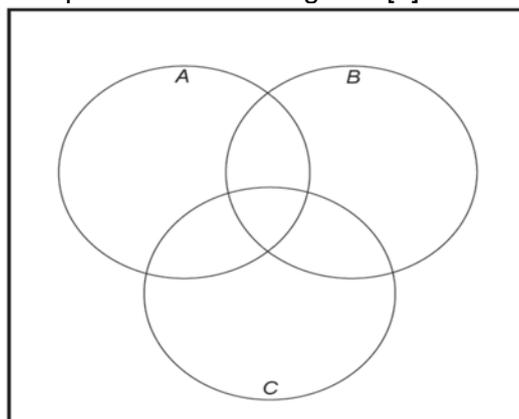
*(b)* Which one of the following Venn diagrams could also be used to represent the sets ε, *A*, *B* and *C* ?
    You must give a reason for your choice. [2]

Venn Diagram 1        Venn Diagram 2        Venn Diagram 3

ε    A    B    C          ε    A    B    C          ε    A    B    C

## Assessment for Learning

| GCSE - Numeracy and Mathematics | Tier: Intermediate | Grade: |
|---|---|---|
| Topic: Simple and Compound Interest and Depreciation. | | E/C |

## Starter

1) Increase £450 by 13%

2) Decrease £8500 by 4%

## Top Tips!

- Use the multipliers, it's much quicker!
  6000 x 0.05 = 300 (5% of 6000)
  6000 x 1.05 = 6300 (increase 6000 by 5%)
  6000 x 0.95 = 5700 (decrease 6000 by 5%)
- Ensure you can use your calculator to calculate percentages!

## Skills:

1) Calculate the simple interest if £6000 is invested for 3 years with an annual simple interest of 4%.

2) Calculate the compound interest if £6000 is invested for 3 years with an annual compound interest of 4%.

3) Calculate the value of an investment after 3 years if £3500 is invested with an annual compound interest of 5.5%.

## Examination Question:

**2015 November Linear P2 Higher Qu 8**

Rowena owns a car that Dafydd is planning to buy in 3 years' time.
Rowena's car is currently worth £3500.
Rowena estimates that her car will repeatedly depreciate by 24% of its value each year. Dafydd has already saved £100.
Dafydd wants to set up a savings account to save a fixed amount of money each month to buy Rowena's car in 3 years' time.
What would be the minimum amount of money, to the nearest pound, that Dafydd should pay into his savings account each month?
You must show all your working. [7]

## Assessment for Learning

## Video / QR code

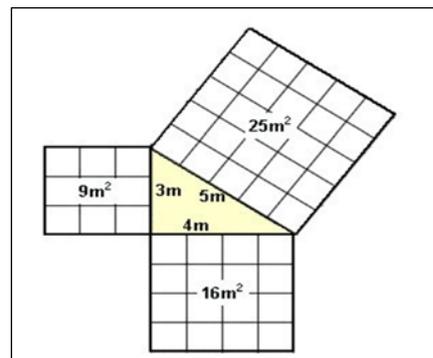| GCSE - Numeracy and Mathematics | Tier: Intermediate | Grade: |
|---|---|---|
| Topic: Pythagoras | | C |

## Starter

1) $8^2 =$
2) $30^2 =$
3) $\sqrt{36} =$
4) $\sqrt{225} =$

## Top Tips!

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

Where c is the hypotenuse

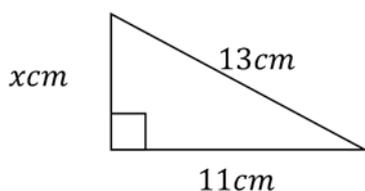(opposite the right angle)

$e.e. \ 5^2 = 3^2 + 4^2$



## Skills:

1. Calculate the value of $x$



9cm, xcm, 12cm
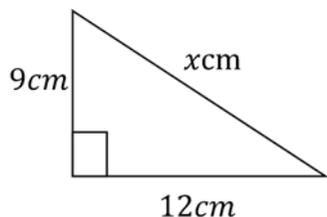
2. Calculate the value of $x$ to 1 decimal place



xcm, 13cm, 11cm

## Examination Question:

Derek wants to have a rectangular metal gate made for his driveway.
The gate must be 2.8m wide and 1.5m high.
The gate is made using 7 thin metal rods.
The four horizontal rods are parallel. The diagonal rod ensures the gate remains strong.
Derek draws a sketch of his design.
Calculate the total length of the 7 rods



*(diagram not drawn to scale)*

## Assessment for Learning

## Video / QR code

| **GCSE - Numeracy and Mathematics** **Topic: Angles** | **Tier: Intermediate** | **Grade:** **E/D/C** | GwE |
|---|---|---|---|

## Starter

What is the total of all the internal angle in a:

Triangle =

Quadilateral =

Pentagon =

## Top Tips! Learn the rules of angles with parallel lines
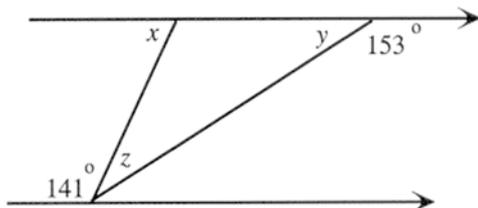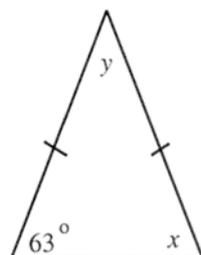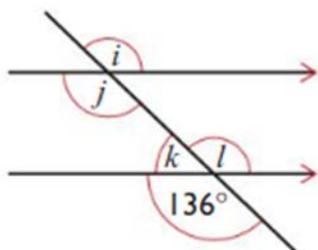
Alternate angles (z) Equal

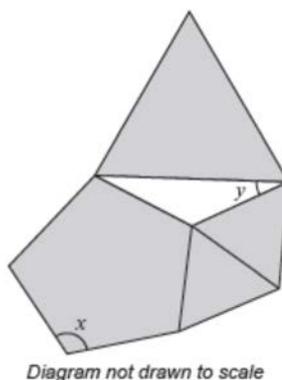Corresponding angles (F) Equal

Interior angles (C/U) Add to 180⁰

## Skills:

Calculate the value of each angle labelled with a letter:

136°

$y$

63° $x$

$x$ $y$ 153°

141° $z$

## Examination Question:

**2015 January Unitised U3 Higher Qu 7,**

Four grey regular polygons join together as shown in the diagram

$y$

$x$

Diagram not drawn to scale

Calculate the size of angle x          [2]

Calculate the size of angle y          [4]

## Assessment for Learning

## Video / QR code

| GCSE - Numeracy and Mathematics | Tier: Intermediate | Grade: |
|---|---|---|
| Topic: Create and Solve Equations | | C |

## Starter

Solve the following equations:

*1)* $x - 4 = 11$

*2)* $\frac{x}{5} + 3 = 12$

## Top Tips!

- Most algebraic problems will involve forming an expression and then solving it .Try to think of the steps involved and the facts you need before thinking about the algebra.
- Common algebra problems involve links with properties of shapes, particularly angles and lengths.
- Read the question twice, underline the key words and consider what information you need before attempting the maths!

## Skills:

The length of a rectangle is $3x - 2$

The width of the rectangle is $x + 3$
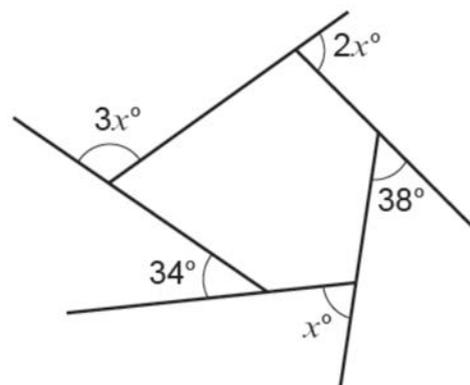
The perimeter of the rectangle is 34cm

What is the area of the rectangle?

## Examination Question:

**2014 November Linear P2 Higher Qu 4**

Calculate the value of $x$?                    [4]



(Diagram not drawn to scale)

## Assessment for Learning

## Video / QR code

## Starter

What is length of each side of a square with an area of 16m²?

How many cm² in 1m² ?

## Top Tips!

Learn the formulas for basic shapes (label the sides/height yourself)
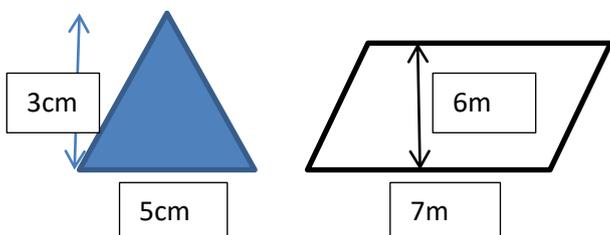
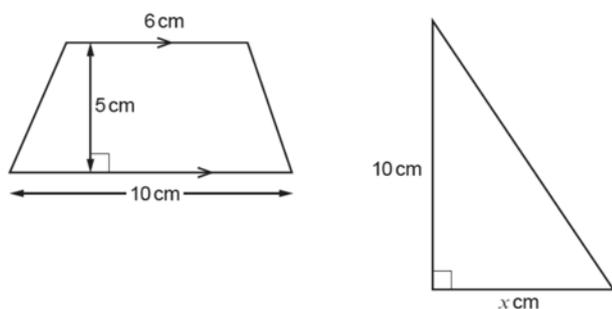$A = l \times w$

$A = \dfrac{b \times h}{2}$

$A = b \times h$

$A = \left(\dfrac{a + b}{2}\right) \times h$

## Skills:

1.  Calculate the area of the following shapes;

3cm

5cm

6m

7m

2.  The area of the trapezium is equal to the area of the right angle triangle (*Diagrams not drawn to scale*)
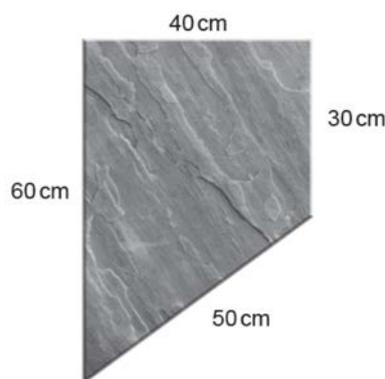
6 cm

5 cm

10 cm

10 cm

$x$ cm

Calculate the value of $x$

## Examination Question:

**2014 January Link - Applications U1 Higher Qu 6**

Tom is making a patio using paving slabs like the one shown below.
Each paving slab is in the shape of a trapezium.

40 cm

30 cm

60 cm

50 cm

Tom used 25 of these paving slabs to make his patio.
He decides to paint the patio with a sealant to prevent staining.
Each tin of sealant that he buys covers an area of 0·8 m².
Each tin of sealant costs £14.49.
Each paving slab costs £8.25.
Tom buys just enough tins of sealant to paint his patio.
Calculate the total cost of buying the paving slabs and sealant. You must show all your working.

## Assessment for Learning

## Video / QR code

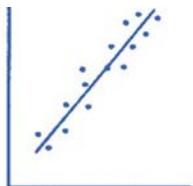| GCSE - Numeracy and Mathematics | Tier: Intermediate | Grade: |
| --- | --- | --- |
| Topic: Scatter Diagrams | | C |

## Starter

In words, describe the relationship between the price and age of cars:

## Top Tips!

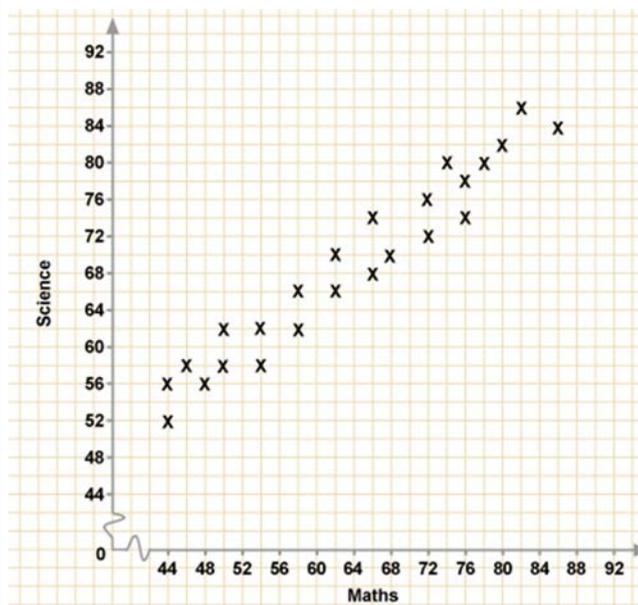Plot the two sets of data but don't join the points!

+ive correlation          -ive correlation          No correlation

## Skills:

1) Catrin scored 48 in her maths test. What was her mark in the science test?

2) What kind of correlation is shown?

3) What was the highest science mark?

4) What is the lowest maths mark?

5) Draw the line of best fit.

## Examination Question:

**2015 January Link - Applications U2 Higher Qu 1**

The scatter diagram displays data for furnished, two-bedroom apartments in a European city. It shows the monthly rental cost and the distance the apartment is from the city centre.
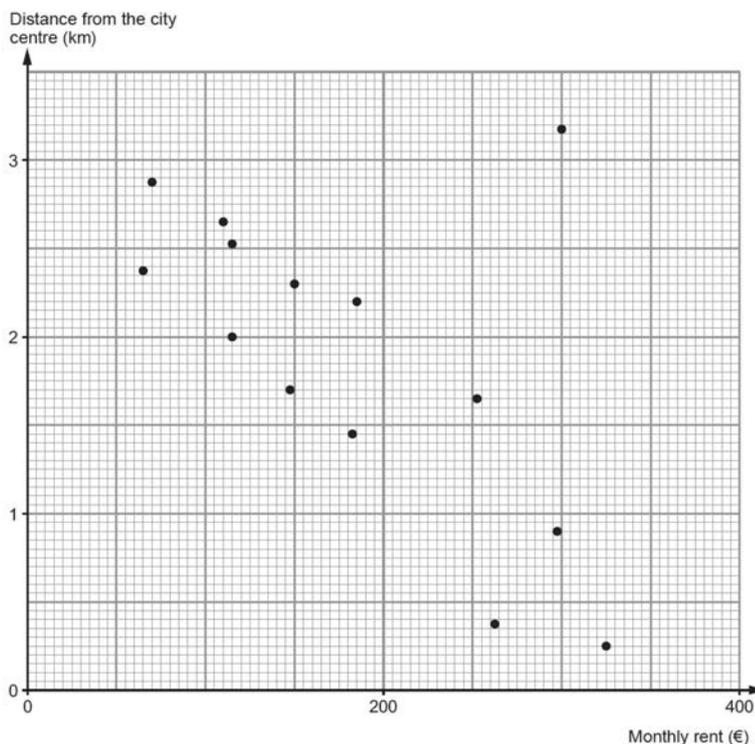
One of the apartments represented on the scatter diagram is a luxury apartment with electronic sound systems and computerised equipment. Can you tell with certainty, from the scatter diagram, which is the luxury apartment? You must give a reason for your answer.  [1]

Draw, by eye, a line of best fit on the scatter diagram. [1]

Use your line of best fit  to estimate the monthly rental cost for a furnished, two-bedroom apartment 1·25 km from the city centre. [1]

| Assessment for Learning | Video / QR code |
| --- | --- |
| | https://corbettmaths.com/2012/08/10/scatter-graphs/ https://corbettmaths.com/2012/08/10/scatter-graphs/ https://corbettmaths.com/2012/08/10/scatter-graphs/ https://corbettmaths.com/2012/08/10/scatter-graphs-correlation/ |

| GCSE - Numeracy and Mathematics | Tier: Intermediate | Grade: | |
|---|---|---|---|
| Topic: Cumulative Frequency Diagram with Box-and-Whisker | | B | GwE |

**Starter:**

Calculate the median and range of the following:   6, 13, 5, 19, 16, 28

**Top Tips!**  Learn to define all the words box and whisker diagram!

Minimum Value — Lower Quartile — Median — Upper Quartile — Maximum Value
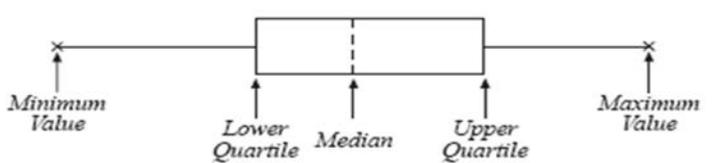
Remember: Interquartile range = Upper quartile – lower quartile

**Examination Question:**

**2014 Summer Link - Applications U1 Higher Qu 10, 2014 January Link - Methods U1 Higher Qu 12**

The table gives the grouped frequency distribution for the lengths of the electrical cords of 80 toasters.
   (a)  Complete the following cumulative frequency table.

| Length to the nearest (cm) | 49-53 | 54-58 | 59-63 | 64-68 | |
|---|---|---|---|---|---|
| Number of toasters | 6 | 38 | 32 | 4 | |

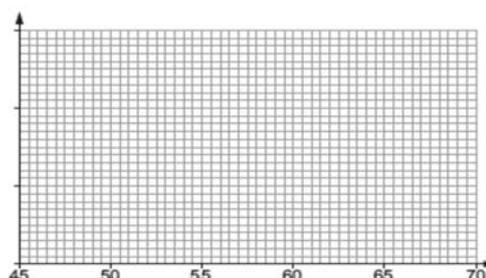| Length (cm) | <48.5 | <53.5 | <58.5 | <63.5 | <68.5 |
|---|---|---|---|---|---|
| Cumulative Frequency | 0 | 6 | | | |

(b) On the graph paper below, draw a cumulative frequency diagram to show this information [2]

Cumulative frequency
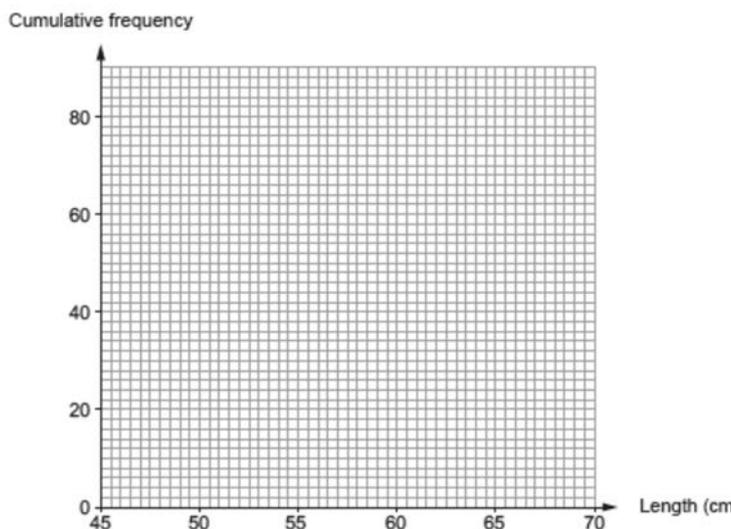
Length (cm

(c) Use your cumulative frequency diagram to find an estimate for the median, the lower quartile, the upper quartile and the interquartile range of the lengths of the electrical cords in centimetres.

| Median | |
|---|---|
| Lower Quartile | |
| Upper Quartile | |
| Interquartile range | |

(d) The length of the shortest electrical cord is 50 cm.
The length of the longest electrical cord is 68cm.
Draw a box and whisker diagram to illustrate the lengths of the electrical cords.

**Assessment for Learning**

**Starter**

Calculate:

1) 7.4 x 100 =
2) 675 ÷ 10 =
3) 6.8 x 1000 =
4) 0.62 ÷ 100 =

**Top Tips!**

In standard form a number is always written as $a \times 10^n$ where a ≤ 10 and n is an integer. Remember:

- Multiply a with 10 'n' number of times (if n is positive)
- Divide a with 10 'n' number of times (if n is negative)

Learn to use standard form on your calculator $\boxed{\times 10^x}$

**Skills:**

1. Fill the gaps in the table below:

| Regular number | Standard Form |
|---|---|
| 7 000 000 | |
| | $2 \times 10^{10}$ |
| 82 300 000 | |
| | $7.601 \times 10^5$ |
| 0.000006 | |
| | $7 \times 10^{-3}$ |
| 0.0000372 | |
| | $2.3 \times 10^{-7}$ |

2. Use your calculator to calculate the following (answer in standard form)
   (a) $(2.3 \times 10^4) \times (5.2 \times 10^{-8})$

   (b) $(8 \times 10^7) \div (2.5 \times 10^{-3})$

**Examination Question:**

**2014 JuneLink - Applications U2 Higher Qu 10**

During an experiment, a scientist notices that the number of bacteria halves every second. There were $2.3 \times 10^{30}$ bacteria at the start of the experiment. Calculate how many bacteria were left after 5 seconds. Give your answer in standard form correct to two significant figures.                    [4]

---

| GCSE - Numeracy and Mathematics | Tier:Intermediate | Grade:<br><br>D/C | **/ QR code**<br><br>ettmaths.com/2013/04/28/standar |
|---|---|---|---|
| Topic: Questionnaires, Bias and | | | |

**Starter**

How could you make the results of a sample more reliable?

**Top Tips!** Learn these important definitions:

- Population: The entire group of people, animals or the things about which we want information
- Sample: A part of the population that we actually collect information from

## Skills:

1. Explain a method to obtain a systematic sample in order to interview 10 workers out of a sample of 600.

2. Wil wants to find out what people in his town think about the sports facilities on offer. He plans to stand outside the sports centre one Monday morning in order to complete a questionnaire. Carol tells Wil that his survey will be biased.

a) Give one reason why the survey will be biased.

b) Describe one change Wil could make to the way in which he is going to carry out his survey so that it will be less biased.

## Examination Question: 2014 Summer Link -AIM U1 Higher Qu 6

A survey is to be carried out to find the popularity of buying books with various age groups of the general population.
The survey is carried out by asking people questions as they come out of a book shop.
Two questions from the survey questionnaire are shown below.

```
1.  How old are you?
    Put a tick in the box.
                            under 20     ☐
                            20 to 30     ☐
                            30 to 40     ☐
                        older than 40    ☐

2.  Do you buy books?
    Put a tick in the box.
                            Yes          ☐
                            No           ☐
```

Explain why this may be a biased survey. [1]

State a criticism about the design of question 1 in the survey. [1]

Write a question with a selection of answer boxes, to find out how much people are
prepared to pay for a paperback book. [2]

## Assessment for Learning

## Video / QR code

https://corbettmaths.com/2013/06/23/questionnaires/
https://corbettmaths.com/2013/11/13/random-sampling/