4748-120 (Evolve) and 4748-220 (Paper-based) Functional Skills Mathematics Level 2

Guidance for Delivery

Version 1.3

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Document revision history

Version	Changed by	Summary of change	Approval date
1.0	Assessment	New template	28/11/2022
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1. Introduction

The following document is intended to support tutors with the delivery of the reformed Level 2 Functional Skills mathematics qualifications.

This should be read in conjunction with the following

- DfE Subject content functional skills: Mathematics

The new subject content requires candidates to demonstrate their competence (functionality) in mathematics at the appropriate level. Achievement of the qualification demonstrates a sound grasp of mathematical skills at the appropriate level, and the ability to apply mathematical thinking effectively to solve problems successfully in the workplace and in other real life situations.

Although there is an emphasis on work-based contexts and financial literacy, the assessments are generic rather than vocationally based.

The subject content is split into three areas: using numbers and the number system; using common measures, shape and space; and handling information and data / statistics. There is naturally much overlap between these sections and drawing on different areas should be encouraged when preparing learners for assessment.

2. Structure of the assessment

Level 2 Functional Mathematics papers comprise two sections: a short section without a calculator available and a longer section in which a calculator is permitted. Within both sections there are context-free questions testing underpinning skills and knowledge and there are problem solving questions requiring candidates to tackle problems in more complex contexts, ie, problems requiring a multistep process requiring some planning and working through at least two connected steps. Candidates will be required to analyse the problems to decide suitable approaches, tackle the problems, achieve solutions and explain findings. Problem-solving questions will account for 75% of the marks on each paper.

	Part 1 **Calculator not permitted** **(25 minutes)**	**Part 2** **Calculator permitted** **(1 hour 20 minutes)**
Underpinning knowledge **(15 marks = 25%)**	10 single mark context free questions	5 single mark context free questions
Problem solving **(45 marks = 75%)**	Between 2 to 5 problem solving questions with practical context (total 5 marks)	1 single mark check (for sense of result) 9 problem solving questions with practical context (mark tariff between 2 and 6 marks each, total 39 marks)

There are two options for assessment:

- an onscreen test (E-volve)
- a paper-based test

Both options are available on demand.

3. Duration

The Level 2 assessment is 1 hour and 45 minutes.

Section 1 is 25 minutes.

Section 2 is 1 hour and 20 minutes.

4. General

The assessment is based on this specification, and teaching should reflect the subject content.

Regardless of which assessment option is chosen, candidates should be familiar with sample papers, which are indicative of content. Both onscreen (E-volve) and paper-based samples will assist this process. Samples of both types are available on the City and Guilds website (found here). It is also important that candidates are aware of the format of the option they have chosen.

E-volve candidates should be given the opportunity to practise onscreen samples. They should be aware that answers must be recorded in the answer boxes where provided and working should be shown in the spaces provided for working. Candidates who fail to do these things will be unable to access compensation marks if their final answer is incorrect. Candidates should be encouraged to practise using the tools in the E-volve test by accessing the familiarisation tool found here. Practise with options 1 (calculator and work box), 5 (table), 7 (diagram), 8 - 11 (charts and graphs) will be of particular value to Level 2 candidates.

In the E-volve test, **for the second section only**, candidates will have access to a basic onscreen calculator. However candidates are permitted to use their own (more sophisticated) calculators and should be advised to do so.

Candidates opting for paper-based assessment should likewise be given the opportunity to practise sample papers. They must also answer in the spaces provided and are advised to show working in order to secure compensation marks if their final answer is incorrect. They must have rulers in order to successfully attempt some of the questions and calculators for the calculator permitted section.

5. Underpinning skills and problem solving

Each of the two Sections will contain a balance of problem solving and underpinning skills questions.

Overall 25% of the marks will be for UPK and 75% for problem solving.

- Section 1 has 10 marks for underpinning skills followed by 5 marks for problem-solving.
- Section 2 starts with 5 marks for underpinning skills and the remaining 40 marks are for open response problem solving questions.

Underpinning skills questions

The first 10 marks in Section 1 and the first 5 marks in Section 2 are for underpinning skills. These questions will normally have no context or a very limited context and minimal reading demand. They are designed to assess standard mathematical processes for the level.

Problem-solving questions

The final 5 marks in Section 1 and the final 40 marks of Section 2 assess problem solving.

Each question will be a single realistic problem based on a topic that (some) people might reasonably meet in everyday life or work. However, as the assessment is not vocationally specific, problems will be generic in nature and therefore not necessarily related to immediate experiences of all candidates.

Ofqual define a problem as

- having **little or no scaffolding**: there is little guidance given to the student beyond a start point and a finish point. **Questions do not explicitly state the mathematical process(es) required** for the solution.
- **information not given in mathematical form or in mathematical language**; or there is a need for the results to be interpreted or methods evaluated, for example, in a real-world context.

Therefore, problem-solving questions will generally not have specific instructions that give the method such as

- Work out the total cost.
- Draw a line of symmetry on the outline.

Instead candidates are more likely to come across questions, eg

- Is the manager correct?

  Explain your answer.
- Which type of ticket do you recommend?
  Explain your reasons. Include figures or calculations to support your decision.

- Did the changes make any difference?
  Explain your findings to the manager. Show calculations to support your explanation.
- Will the man be better off in the new job?
  Give a reason for your answer.

Candidates will be expected to choose an appropriate approach and methods as well as carry out calculations. They will also be given opportunities to interpret information.

6. Question types

Papers will be a mixture of the following question types, whichever format the learner opts to sit:

- short answer
- multiple choice question (MCQ)
- producing a graph / chart / table / diagram.

Drawing graph/chart items Each paper will have one question that requires the candidate to construct a chart or graph OR diagram (see below). They will have to choose titles and axis labels; choose a suitable scale and plot bars or lines.

Drawing diagram items A paper may require the candidate to draw a diagram instead of a graph or chart.

It is strongly recommended that candidates taking the E-volve papers practise drawing charts, graphs and diagrams with the online tools in advance of sitting the paper.

7. Sample papers

Sample assessments can be found on the City & Guilds website at the following link:

www.cityandguilds.com/what-we-offer/centres/maths-and-english/functional-skills

8. Tips

8.1. Subject content

Centres should be aware of all the detailed subject content specified for Level 2 in the DfE Subject content document (DfE Subject content functional skills: Mathematics) and be aware that Level 2 content also subsumes all level content below Level 2.(see appendix 2)

Particular attention is drawn to the following significant 'upgrading' from previous Level 2 specifications (numbers refer to DfE Subject content):

19. Use coordinates in 2-D, positive and negative, to specify the positions of points

21. Draw 3-D shapes to include plans and elevations

22. Calculate values of angles and/or coordinates with 2-D and 3-D shapes

24. Estimate the mean of a grouped frequency distribution from discrete data

26. Work out the probability of combined events including the use of diagrams and tables including two-way tables

28.Draw and interpret scatter diagrams and recognise positive and negative correlation

8.2. General calculation issues

Candidates must understand order of operations conventions (BIDMAS) and apply them to calculations. Online Candidates should be aware that the E-volve calculator currently does not automatically apply BIDMAS.
Candidates must also be able to apply these rules when using formulae, including algebraic equations.
Candidates should use estimation and approximation techniques when required, including checking calculations.

8.3. Explanations / comments needed for problem solving questions

Problem solving questions may specify a requirement for explanation (comments). Candidates must be aware that, although marks will be awarded for relevant calculations, full marks will require a suitable explanation using their results, preferably with reference to numerical values calculated:

eg the first option is cheaper by £4.50

eg, A is warmer than B average temperature for A is 26°C > 19°C for B

Candidates must also be prepared to explain why an answer is sensible (or not) based on mathematical process rather than calculated results.

Candidates should be taught the distinction between averages and range and how to use each in explanations in context.

8.4. Presentation of results / workings

The importance of showing working on the assessments, ie to show calculations and methods used, should be stressed, particularly so that potential compensation marks, in the event of incorrect answers, are accessible to the candidate. This should be emphasised to online candidates who may use ‘pencil and paper’ methods initially to formulate their solutions.

Candidates need to understand the use of scales in scale diagrams and be prepared to construct scale diagrams, including plans and elevations.

Candidates should be taught to use a variety of presentation methods to summarise results, including graphs, charts and tables. They must understand that a table is not a chart (and vice versa). Summary tables should be systematically constructed to include rows and columns with appropriate headings.

Level 2 candidates must be prepared to construct scatter graphs and to draw and understand trend lines.

Additionally, they may require presentation methods listed in the Level 2 subject content (27), ie line graphs, bar charts and pie charts.

Candidates who choose to access assessment online need to be prepared not only in terms of the prescribed Functional Skills Specification, but also in terms of using the E-volve platform. They must be well practiced in the use of the presentation tools (tables, diagrams, charts and graphs) including how to insert sufficient text, keys and the use of sensible scales.

Appendix 1 Amplification of (DfE Subject Content)

Functional Skills mathematics qualifications at Level 2 should:

- Indicate that students can demonstrate their ability in mathematical skills and their ability to apply these, through appropriate reasoning and decision making, to solve realistic problems of increasing complexity;
- Introduce students to new areas of life and work so that they are exposed to concepts and problems which, while not of immediate concern, may be of value in later life; and
- Enable students to develop an appreciation of the role played by mathematics in the world of work and in life generally

1.1 Overview of Level 2 Functional Maths requirements

Centres should use the broad outline presented below in conjunction with the subject criteria specifications (SCS).

<table>
<tr><th colspan="2">DfE Subject Content: Overview of sections (Level 2)</th></tr>
<tr><td>Use of numbers and the number system
Students at Level 2 are expected to be able to use numbers of any size; read, write and make use of positive and negative integers of any size; use, order and compare integers, fractions, decimals, percentages and ratios as well as recognise the value of a digit in any whole or decimal number. They can use numerical and spatial patterns for a purpose and calculate with, and convert between, numbers written as fractions, decimals, percentages and ratios.</td><td rowspan="3">Solving mathematical problems and decision making
Students at Level 2 are expected to be able to use knowledge and skills to recognise and obtain a solution or solutions to a complex problem. A complex problem is one which requires a multistep process, typically requiring planning and working through at least two connected steps or processes. Individual problems are based on a combination of the knowledge and/or skills from the mathematical content areas (number and the number system; measures, shape and space; information and data). At Level 2 it is expected that the student will be able to address individual problems some of which draw upon a combination of all three mathematical areas and require students to make connections between those content areas.
The context of individual problems at this level will require interpretation and analysis in order for the student to be able independently to identify and carry out an appropriate mathematical process or processes.</td></tr>
<tr><td>Use of measures, shape and space
Students at Level 2 are expected to be able to handle relationships between measurements of various kinds, use angles and coordinates when involving position and direction and make use of geometric properties in calculations with 2-D and 3-D shapes and understand the relationships between them.</td></tr>
<tr><td>Handle information and data:
Students at Level 2 are expected to be able to construct, interpret and evaluate a range of statistical diagrams. They can</td></tr>
</table>

calculate and interpret probabilities. They can calculate, analyse, compare and interpret appropriate data sets, tables, diagrams and statistical measures such as common averages (mean, median, mode) and spread (range), and use statistics to compare sets of data. They can identify patterns and trends from data as well as recognise simple correlation.	

1.2 Subject Content Specifications (SCS)

1. Read, write, order and compare positive and negative numbers of any size

- large and small numbers written as numbers, words or powers of 10
  million (m) = 10^6 = 1 000 000
  billion (bn) = 10^9 = 1 000 000 000 (one thousand million as used in finance eg $4bn)

- Write amounts of money correct to two dp in the correct context
  Eg: The total amount of money on an order form would be £134.70, **NOT** £134.7

- put the following in increasing order:
  3050 *three hundred and sixty two* 3×10^3 −351 0 −3

2. Carry out calculations with numbers up to one million including strategies to check answers including estimation and approximation.

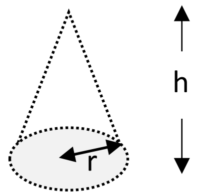
- add, subtract, multiply, divide, use indices
  $10^3 \times 10^2 = 10^5$ (=100 000) $10^3 + 10^2 = 1100$
- $\frac{1}{3} x\ 21$ is 21 ÷ 3
- round numbers to the nearest 1, 10, 100, 1000
  15 to nearest 10 = 20, 2.6 to the nearest 1 = 3
- round numbers to given number of decimal places
  65.3794 to 2dp is 3dp
- round numbers to given numbers of significant figures
  65.3794 to 3sig figures is 65.4
- understand when rounding up and rounding down is appropriate
  eg round up 14.6 to 15 (rolls of wall paper as cannot buy 0.6 rolls)
  eg round down (truncation) 6.7 to 6 (number of applications of fertiliser as 0.7 is not enough for a complete application)
- check by approximation eg 25 x 50 = 1250 checks 24 x 48 = 1152
- check by reverse calculation eg 1152 ÷ 48 = 24 checks 24 x 48 = 1152

3. Evaluate expressions and make substitution in given formulae in words and symbols.

- simple algebraic equations
  $a + 2b^2 = 36$ what is b if a = 4 (b = 4)
  $3xy = 12$ what is y if x = 4 (y = 1)

- know the difference: xy (represents x multiplied by y) is not same as x+y (x added to y) and similarly 2y is 2 multiplied by y and $\frac{y}{2}$ is the same as $\frac{1}{2}y$ (y divided by 2)

- substitute values into formulae in symbols
  eg $V = \frac{\pi r^2 h}{3}$ for volume of cone



- substitute values into word formulae
  eg $monthly\ payment = \frac{total\ cost + 13.5\%}{period\ of\ loan\ in\ months}$ for repayment of bank loan

4. Identify and know the equivalence between fractions, decimals and percentages.

- equivalence $\frac{1}{10} = 10\% = 0.1 = 10^{-1}$ $\frac{1}{100} = 1\% = 0.01 = 10^{-2}$
- percentages as decimals 5% = 0.05 50% = 0.5
- fractions as decimals eg $\frac{3}{16}$ = 3 ÷ 16 (on calculator) = 0.1875
- convert harder fractions with calculator, eg one millionth $\frac{1}{1000000} = 0.000001$
- decimals rounded to given number decimal places (dp) eg 0.1875 to 2dp = 0.19
- fractions expressed in simplest form $\frac{44}{121} = \frac{4}{11}$
- put the following in decreasing order $\frac{1}{30}$ 0.3 $\frac{1}{300}$ 33%

5. Work out the percentages of amounts and express one amount as a percentage of another

- percentages of amounts
  6% of 250 = 15 from 0.06 x 250 (calculator) or 250 ÷ 100 x 6 (non calculator)
- amount as a percentage of another
  18 as a percentage of 120 = 15%

6. Calculate percentage change (any size increase and decrease) and original value after percentage change

- percentage increase
  200 increased by 40% = 280 from 200x 1.4 (derived from 1 + 0.4)
- percentage decrease
  200 decreased by 40% = 120 from 200 x 0.6 (derived from 1 – 0.4)
- percentage change

£720
Including 20% VAT

find price before VAT added = £600
from $\frac{720}{120}$ x 100 = 600

Company results		
year	2019	2020
profit	£8 000	£10 000

find the percentage increase in profit = 25%
from $\frac{10000-8000}{8000}$ x 100 = 25

7. Order, add, subtract and compare amounts or quantities using proper and improper fractions and mixed numbers

- proper fractions: greater than 0 but less than 1, eg $\frac{3}{4}$
- improper fractions: greater than 1, eg $\frac{4}{3}$
- mixed numbers, eg $\frac{4}{3}$ (improper fraction) = $1\frac{1}{3}$

place the following in order of decreasing value: $\frac{1}{2}$, $\frac{7}{3}$, $\frac{1}{23}$, $\frac{9}{2}$, $1\frac{1}{5}$

ie $\frac{9}{2}$, $\frac{7}{3}$, $1\frac{1}{5}$, $\frac{1}{2}$, $\frac{1}{23}$

- present fractions in simplest form (division of numerator and denominator by common divisor) eg $\frac{28}{35} = \frac{4}{7}$

- addition and subtraction of fractions using common denominator

$$3\frac{1}{7} + \frac{23}{35} = \frac{22}{7} + \frac{23}{35} = \frac{110+23}{35} = \frac{133}{35}$$

$$= 3\frac{28}{35} \qquad = 3\frac{4}{5}$$

$$3\frac{1}{7} - \frac{12}{35} = \frac{22}{7} - \frac{12}{35} = \frac{110-12}{35} = \frac{98}{35}$$

$$= 2\frac{28}{35} \qquad = 2\frac{4}{5}$$

- Note: multiplication and division using fractions is also required (when using formulae) using cancellation

$$V = \pi r^2 h$$

$$V = \frac{22}{7}\ x\ 49\ x\ 10$$

$$V = \frac{22}{\cancel{7}}\ x\ \cancel{49}\ 7\ x\ 10$$

$$V = 1540$$

8. Express one number as a fraction of another

- evaluate the size of one number compared to another, eg 2 is $\frac{1}{10}$ of 20.
- present answer in simplest form (see also SCS 7), eg $\frac{3}{27} = \frac{1}{9}$

what fraction of 250 is 50? $\frac{50}{250} = \frac{1}{5}$

9. Order, approximate and compare decimals

- understand significance of decimal point position

  0.1 is ten times larger than 0.01

  0.003 is one thousand times smaller than 3

- approximate values to given numbers of decimal places (dp)
  3.94352 to 2dp is 3.94
  3.94352 to 3dp is 3.944

- approximate decimal values to percentage and fraction equivalents (see also SCS4)
  0.97 ≈ 100%   0.7666 ≈ 77%
  0.247 ≈ $\frac{1}{4}$
- know when it is inappropriate to use approximate values in calculations
  eg one third of £57 is $\frac{1}{3}$ x £57 = £19   **NOT** 0.33 x £57 = £18.81

- order decimals
  place the following in increasing order of value:
  7.651 1.765 1.076 1.567 1.657   (ie 1.076 1.567 1.657 1.765 7.651)

10. Add, subtract, multiply and divide decimals up to 3 decimal places

- without calculator

eg 0.65 + 0.345 eg 0.735 – 0.21

$$\begin{array}{r} 0.65 \\ +0.345 \\ \hline \mathbf{0.995} \\ \hline \end{array} \qquad \begin{array}{r} 0.735 \\ -0.21 \\ \hline \mathbf{0.525} \\ \hline \end{array}$$

eg 2.25 x 0.02 = 0.045
eg 4.50 ÷ 0.05 = 90

- with calculator
care required when reading decimal points, encourage checking for sense

eg 34.12 x 12.541 ≠ 4278.989 (approximation 30 x 10 = 300 means result of wrong order of magnitude)

11. Understand and calculate using ratios, direct proportion and inverse proportion.

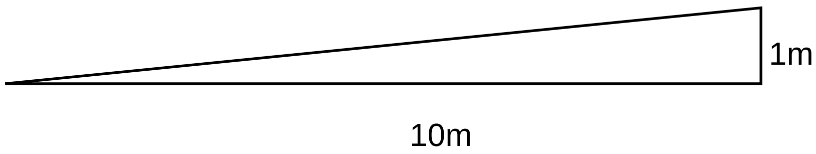
- use a ratio to calculate amounts; ratio expressed as 4 : 7 is based on 11 parts
eg 140kg concrete made from 1 part cement : 2 parts sand : 4 parts gravel
sand required = (140 ÷ 7) x $2 = 40\text{kg}$

- simplify a ratio, e.g 4:8 is the same as 1:2

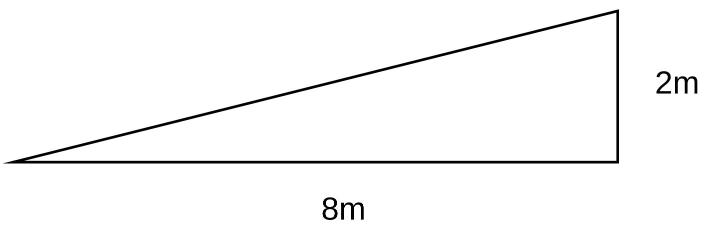
- direct proportion - as one number increases, the other increases proportionally (y = kx).
eg a 250g pack of butter contains 897.5calories, how many calories in 100g?
(900 ÷ 250) x100 = 360 calories
(ie y = kx; 900 = 250k; $k = \frac{900}{250} = 3.6$; $y = 100 \text{ x } 3.6 = 360$)

- inverse proportion- as one number increases, the other decreases proportionally (y = k/x)
eg a journey takes 4 hours at an average speed of 50mph, how much longer will the journey take at an average speed of 40mph?
$\frac{5}{4}\ x\ 4 = 5$ hours
(ie $y = \frac{k}{x}$; $50 = \frac{k}{4}$; $k = 4x50 = 200$; $x = \frac{200}{40} = 5$)

- understand slope (gradient) expressed as eg 1 in 10 or 10%



Gradient
1 in 10 or 10%



Gradient
1 in 4 or 25%
is steeper than
1 in 10
4<10
25%>10%

- Understand converting amounts of money from one country to another given a conversion rate

  Eg: \$1(USD) = €0.94 Euro. What is the value of €230

  230 ÷ 0.94 = \$244.68

12.Follow the order of precedence of operators including indices

- Calculate numbers with indices
  3^2 = 3x3 = 9 3^3 = 3x3x3 = 27 3^4 = 3x3x3x3 = 81
- Calculate whole number square roots
  $\sqrt{25} = 5$
- understand and use BIDMAS (order of operations) when making calculations

B	**brackets**
I	**indices**
D	**division**
M	**multiplication**
A	**addition**
S	**subtraction**

eg 3^4 + 7 x 3 – 9 = 98

first	3^4	81
second	7x3	21
third	81+21	102
fourth	102 -4	98

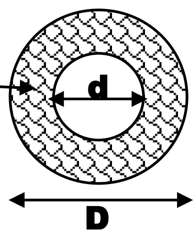
(3^4 + 7) x (3 – 9) = −528

first	3^4 + 7	81 + 7 = 88
	3 - 9	−6
second	88 x −6	−528

(3^4 + 7) x 3 – 9 =253

first	3^4 + 7	81 + 7 = 88
second	88 x 3	264
third	264 – 9	253

- particularly important in some given formulae
  eg $A = \frac{\pi(D^2-d^2)}{4}$
  for outer area



13.Calculate amounts of money, compound interest, percentage increases, decreases and discounts including tax and simple budgeting

- calculate a percentage increase
  eg add 20% VAT to a bill for £27.65
  27.56 x 1.2 = **£33.18**

- calculate a percentage decrease
  eg what money is left after income tax for a person earning £35 000 per year
  personal allowance (given) is £12 500, taxable pay = £35 000 – 12 500 = £22 500
  money left = 12 500 + 22 500 x 0.8 = **£30 500**

- calculate a percentage change using $\frac{\text{new value} - \text{old value}}{\text{old value}} \text{x} 100\%$

  eg a company makes a profit of £160 000 in 2019. In 2020 the profit is £180 000. What is the percentage increase in profit?

$$\frac{180000 - 160000}{160000} \text{x } 100 = 12.5\%$$

- understand simple interest as a one-off addition of a percentage to an original amount
  eg a man puts £1000 in a savings account that pays interest at 1.5% per year - what is the amount he has after one year?
  amount after one year = original amount + 1.5% of original amount = 1000 + 15 =£1015

- understand compound interest as accumulated interest paid on a number of regular occasions (interest is added to each new amount)

  eg a man puts £1000 in a savings account that pays interest at 1.5% per year for 3 years - what is the amount he has after the three years: £1045.68

	amount at start of year (£)	+	interest (£)	amount (£)
year 1	1000	+	1000x0.15	1015
year 2	1015	+	1015x0.15	1030.225
year 3	1030.225	+	1030.225x0.15	**1045.678375**

- understand and use a given formula for compound interest calculations:

eg $A = P(1 + r)^t$
where *A* is amount at end of period
P is amount at start of period
r is the % interest expressed as decimal fraction
t is the number of times interest is applied

for the example above:
$A = 1000(1 + 0.15)^3$
$A = 1000x(1.015)^3$
$A = £1045.68$

- understand and calculate simple accounting / budgeting

  eg complete the profit and loss table (answer in red)

February profit / loss		running total
week 1	-£ 121.60	-£121.60
week 2	£ 213.40	£ 91.80
week 3	-£ 35.60	£ 177.80
week 4	£ 106.50	£ 70.90
	total	£ 162.70

eg make a customer bill

PAINT SHOP CUSTOMER BILL			
		unit price	cost (£)
paint	3 tins	19.99	59.97
brushes	2	3.99	7.98
		sub total	67.95
		12.5% customer discount	-8.49
		total	59.46
		VAT @ 20%	11.89
		total to pay	**71.35**

14. Convert between metric and imperial units of length, weight and capacity using a) a conversion factor and b) a conversion graph

- convert within same system
  1metre = 100cm = 1000mm
  NB do not confuse linear measure with area and volume measures
  eg 1 m^2 = 10 000 cm^2 not 1000 cm^2
  10 000 m^2 = 1 hectare
  1 tonne = 100kg   1kg = 1000g   1g =1000mg
  1 litre =1000ml

- know common imperial measures
  12 inches = 1 foot   3 feet = 1yard
  1 pound = 16 ounces
  8 pints = 1 gallon

- convert across systems with given conversion factors
  miles to km;
  yards or feet to m or cm
  pounds to kg
  also ^{o}F to ^{o}C

  eg kilometres to miles 1mile = 1.6093km
  what is 130km in miles?
  130 ÷ 1.6093 = 80.78 miles (to 2dp) check for sense: 1<1.6, so miles will be fewer than km

eg Is 50kph the same as 30mph?

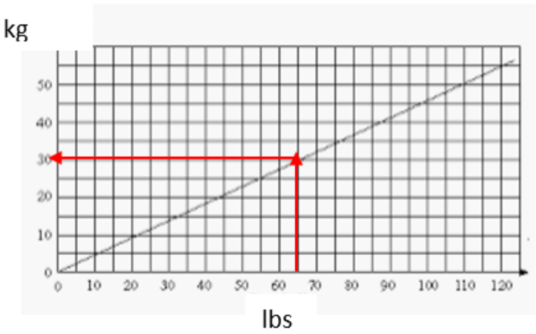
50 ÷ 1.6093 = 31.07mph **or** 30 x 1.6093 = 48.28kph No, 50kph is more than 30mph

Understand that conversions between measures may require different level of accuracy

Eg: 1oz = 25g or 1oz = 28.2495 grams depending on context.

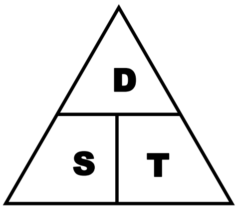
- use conversion graphs

eg what is 65lbs in kg?



15. Calculate using compound measures including speed, density and rates of pay

- understand compound measures expressed as eg miles **per** hour that **per** indicates division
- calculate speed, distance and time making sure that units are consistent



speed (S) = distance (D) ÷ time (T)
distance (D) = speed (S) x time (T)
time (T) = distance (D) ÷ speed (S)

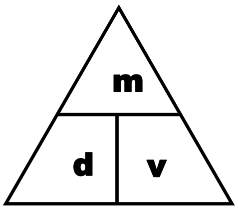
eg how long will it take someone to walk 7.5km at 4kph pace?

T = D/S, so T = 7.5 ÷ 4 = 1.875 hours

0.875 x 60 = 52.5 minutes

Answer: 1hour 52.5minutes

- calculate and use density expressed as mass / volume eg 19.32g/cm^3 for gold



density (d) = mass (m) ÷ volume (v)
mass (m) = density (d) x volume (v)
volume (v) = mass (m) ÷ density (S)

eg A wood beam measures 20m x 50mm x 400mm and has a density of 500kg/m^3.
What is the weight (mass) of this beam?
Make sure units are consistent: 20 x 0.05 x 0.4 = 0.4m^3
m = d x v   m = 500 x 0.4 = 200kg

- calculate and use rates of pay

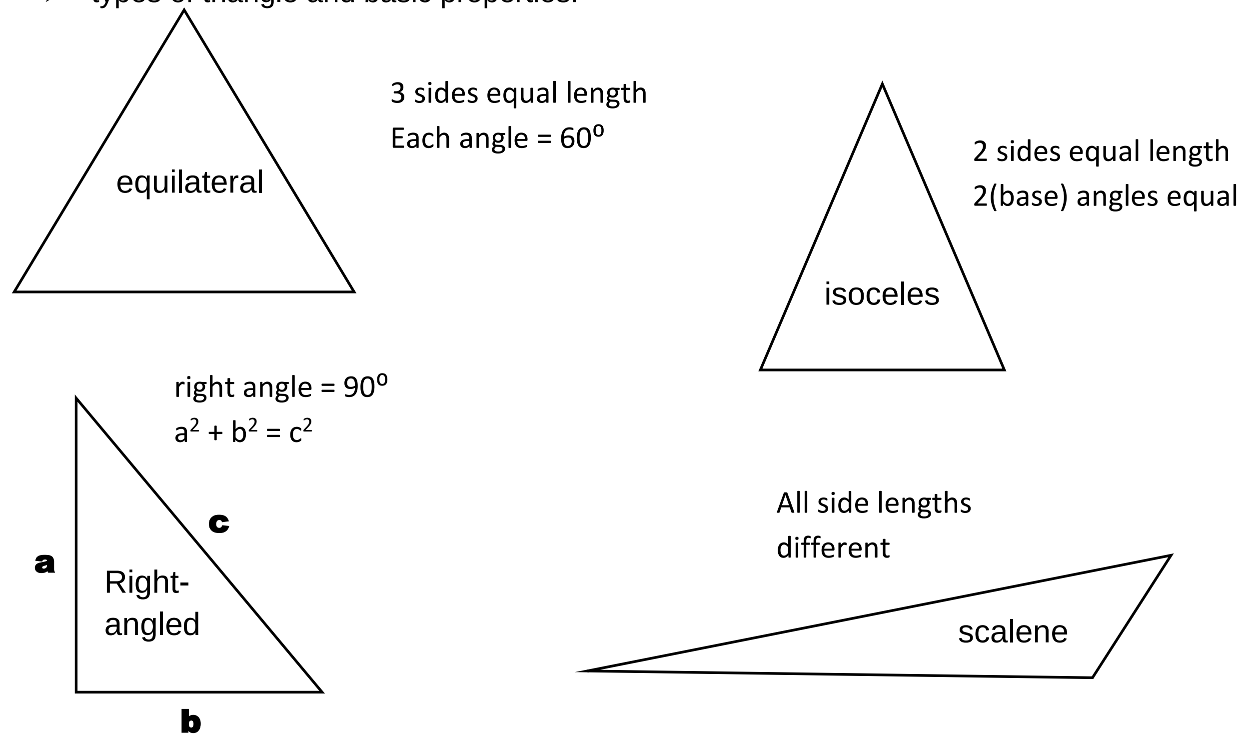
eg a 19 year-old worker, on the national minimum wage, works 37½ hours a week.
How much will the worker earn per year?

National minimum wage				
age	Apprentice	16-17years	18-20 years	21-24 years
rate per hour	£3.90	£4.35	£6.15	£7.70

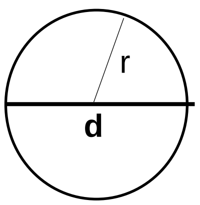
6.15 x 37.5 x 52 = £11992.50

16. Calculate perimeters and areas of 2-D shapes including triangles and circles and composite shapes including non-rectangular shapes (formulae given except for triangles and circles)

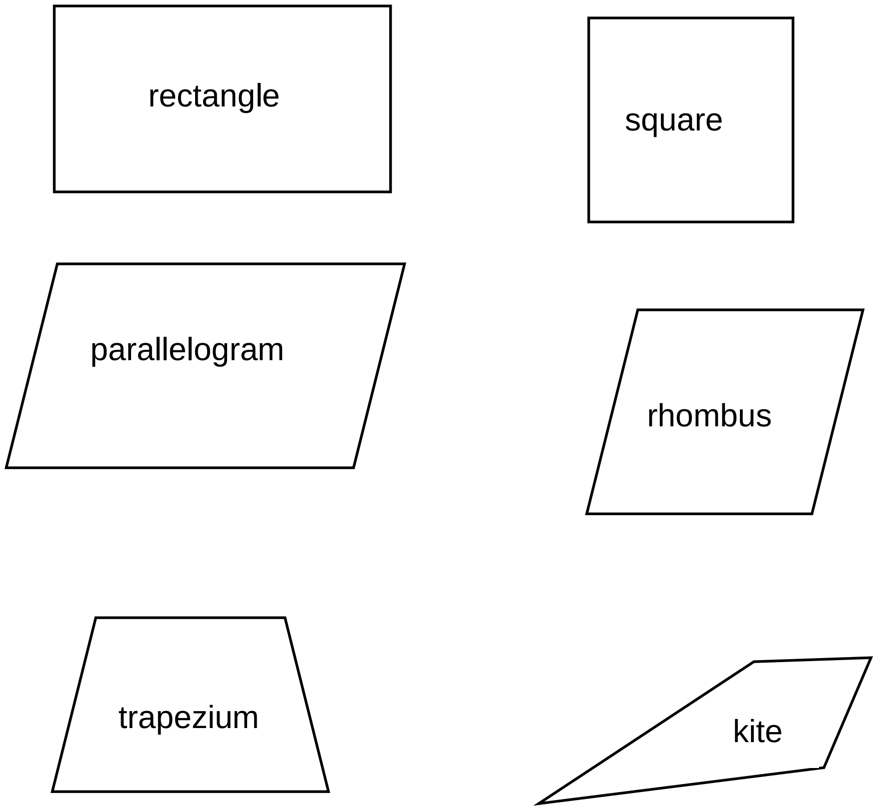
- know basic properties of all triangles: three sides, degrees add up to 180
- ***must know*** perimeter = lengths of all 3 sides added together
- ***must know*** area = ½ base x vertical height
- types of triangle and basic properties:



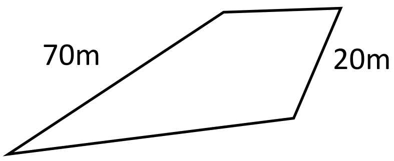
- know basic properties of circles: circumference; diameter = 2 x radius
- ***must know*** circumference (perimeter) $C = \pi d$ or $C = 2\pi r$
- ***must know*** area $A = \pi r^2$
- if value for π given eg 3.14 or $\frac{22}{7}$, then candidates must use the given value
- if value for π not given, candidates may use pi button on calculator or any other suitable value eg 3.142, 3.14 or $\frac{22}{7}$



- know basic properties of regular quadrilaterals: 4 sides; parallels; diagonals, angles add up to 360º
- ***must know*** perimeter = lengths of all 4 sides added together
- ***must know*** area for rectangle/square = length x breadth
- calculate other areas for quadrilaterals from composite areas of triangles



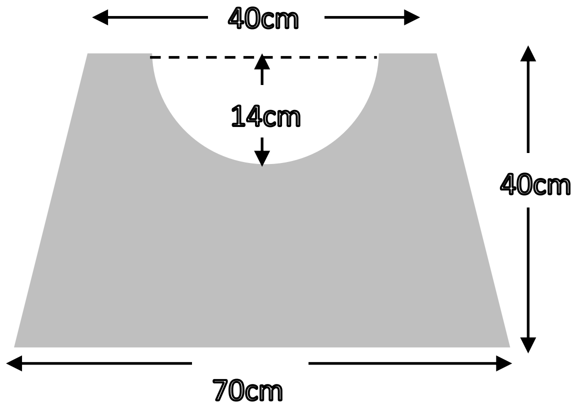
eg What is perimeter of this regular quadrilateral?

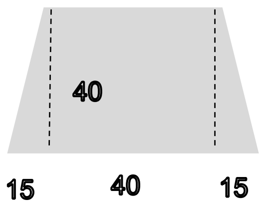


perimeter = 70+20+20+70 = 180m

- calculate areas and perimeters of composite shapes

eg A carpenter cuts a semicircle from a regular trapezoid wood piece.
What is the area of the remaining wood?
Use $\pi = \frac{22}{7}$





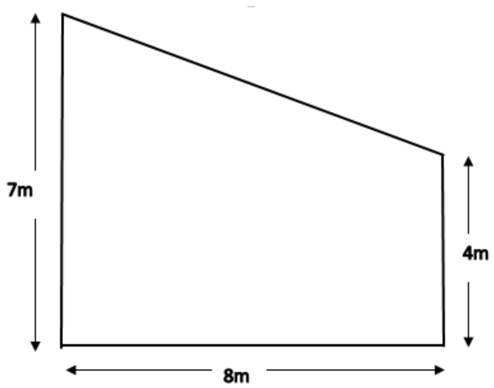
Area of trapezium = 2  + 

= (2 x ½ x 15 x 40) + (40 x 40)
= 600 + 1600 = 2200cm^2

Area of semi circle (radius =14)
= ½ x $\frac{22}{7}$ x 14 x14 = 308cm^2

Answer 2200 – 308 = **1892cm^2**

eg A painter needs to know the area of a wall.



What is the area of the wall?

Rectangle = 8 x 4 = 32

Triangle = ½ x 8 x 3 = 12

32 +12 = 44m^2 Answer

17. Use formulae to find volumes and surface areas of 3-D shapes including cylinders (formulae to be given for 3-D shapes other than cylinders)

Note: formulae requiring calculation of square roots will not be used

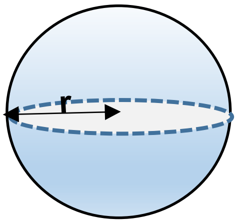
- know how to substitute into and calculate with given formulae
  formulae will be **given** for 3-D shapes **except** cuboids and cylinders

- value for pi (π) often given in question and should be used. If value not given, candidates may use any from $\pi = \frac{22}{7}$ $\pi = 3.14$ $\pi = 3.142$ or π value from calculator

- be aware of common error : if diameter labelled, it must be halved if radius required in formula

eg **sphere**

$V = \frac{4\pi r^2}{3}$ or $V = \frac{4}{3}\pi r^2$ for volume

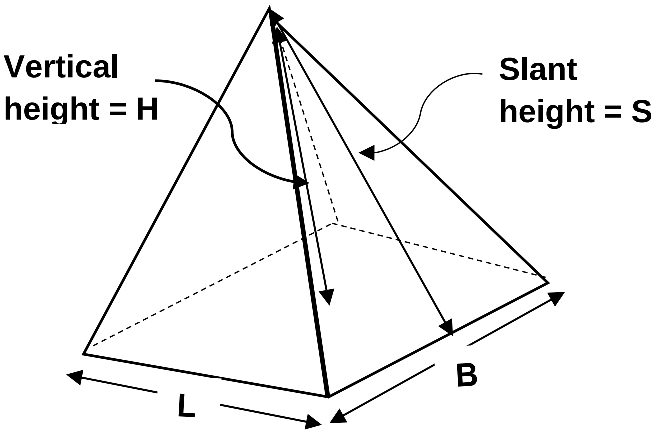


$A = 4\pi r^2$ for surface area

eg **tetrahedron** (4-sided pyramid)

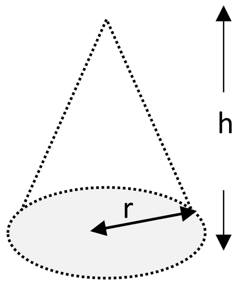
$V = \frac{LBH}{3}$ or $V = \frac{1}{3}LBH$ for volume

$A = LB + (L + B)S$ for surface area



eg **cone** (volume only)

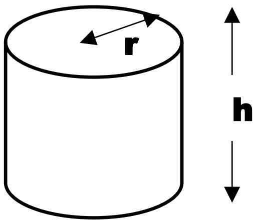
$V = \frac{\pi r^2 h}{3}$ for volume of cone



- must know formulae for **cylinder**

$V = \pi r^2 h$

$A = 2\pi r^2 + 2\pi rh$



18. Calculate actual dimensions from scale drawings and create a scale diagram given actual measurements

- understand and use scales given
  eg 1:10 means 1 unit represents 10 units
  eg 1:25 000 means 1 unit represents 25 000 units

Although Level 2 candidates are expected to understand scales expressed in the above form, simpler explanations are also acceptable.
eg the scale is 2 squares = 1 metre, so 3 metres is 6 squares
eg 1cm represents 50cm and 6cm is 300cm = 3m

- understand the principle of scaling up (reading actual measurements from a scale plan)
  eg 15cm on a scale plan drawn 1:200 is (15 **x** 200)cm = 3000cm = 30m
  eg 5cm on a map with scale 1:25 000 is (5 **x** 25 000)cm = 125 000cm = 1.25km

- understand the principle of scaling down (converting actual measurements for drawing a scale plan)
  eg draw a floor area 12m by 8m to scale 1:50
  12m = 1200cm 1200 ÷ 50 = 24cm on plan; similarly 800 ÷ 50 = 16cm on plan

- Graph paper used in assessments will normally be 2mm graph paper. In the online environment, clearly the graph paper will not be actual size, but candidates may assume that each small square measures 2mm.

- read a scale plan

eg A farmer need to put fencing around a field and buy a gate.
He has the following scale plan of the field.

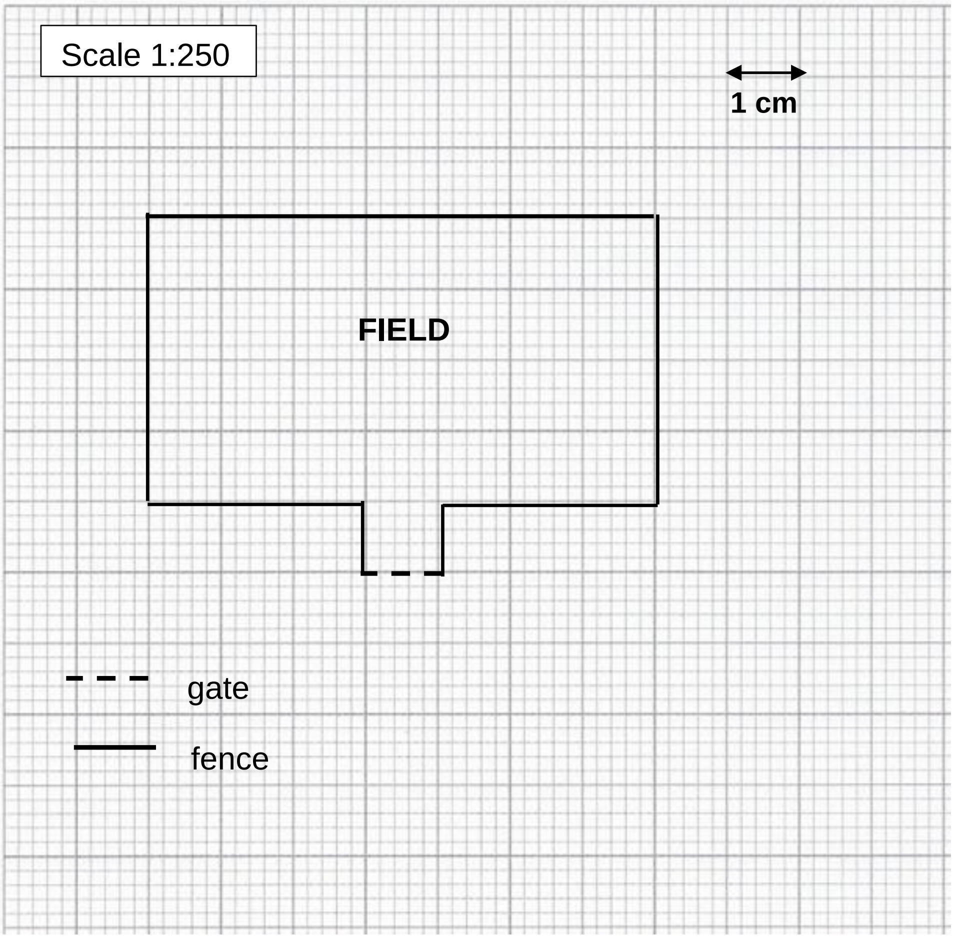
How many metres of fencing does he need and what width gate must he buy?

Plan: fence perimeter =
7+ 4+ 3+ 1+ 1 +3+ 4
= 23cm

23 x 250 = 5750cm
= **57.5m**

Gate: 1cm wide

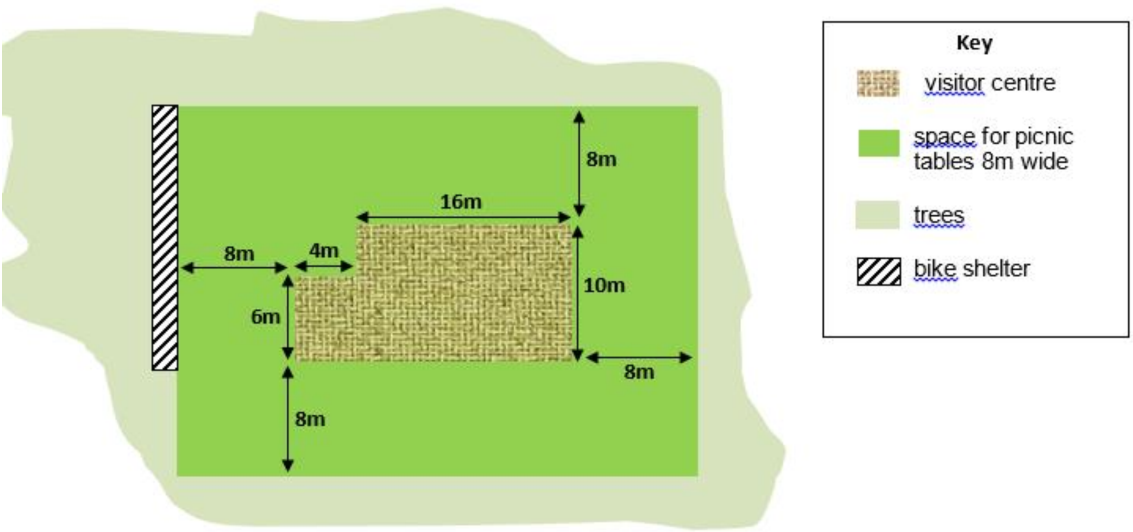
1 x 250 = 250cm
= **2.5m**



- draw scale plans from given dimensions (plans should be labelled with scale used)

  eg The following diagram shows a sketch of a country park visitor centre and its surroundings.

Not to scale

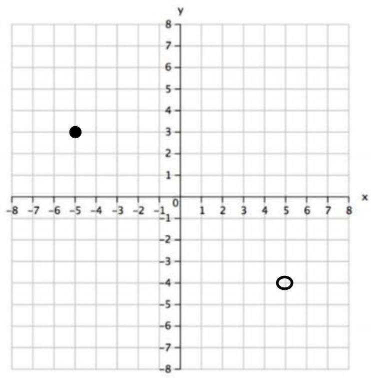


Draw a scale plan of the visitor centre.

19. Use coordinates in 2-D, positive and negative, to specify the positions of points

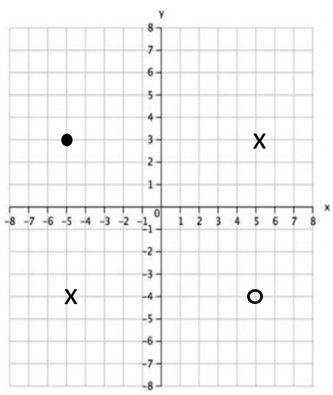
- identify coordinates - read horizontal axis (x) before vertical axis (y)

  eg identify the coordinates of the points marked



● -5,3
○ 5, -4
Answer

eg find coordinate that makes right angle triangle

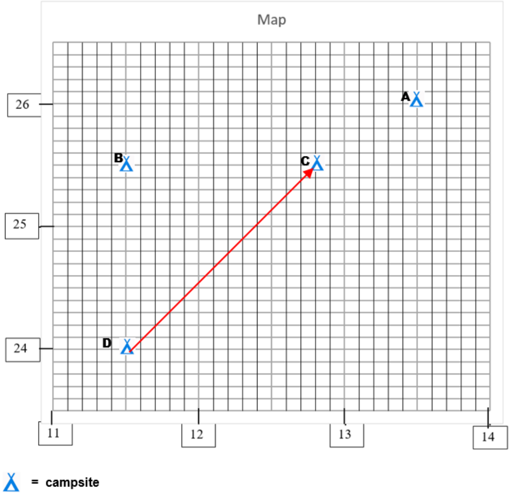


x 5,3
or -5, -4
Answer

➢ identify map coordinates (references)

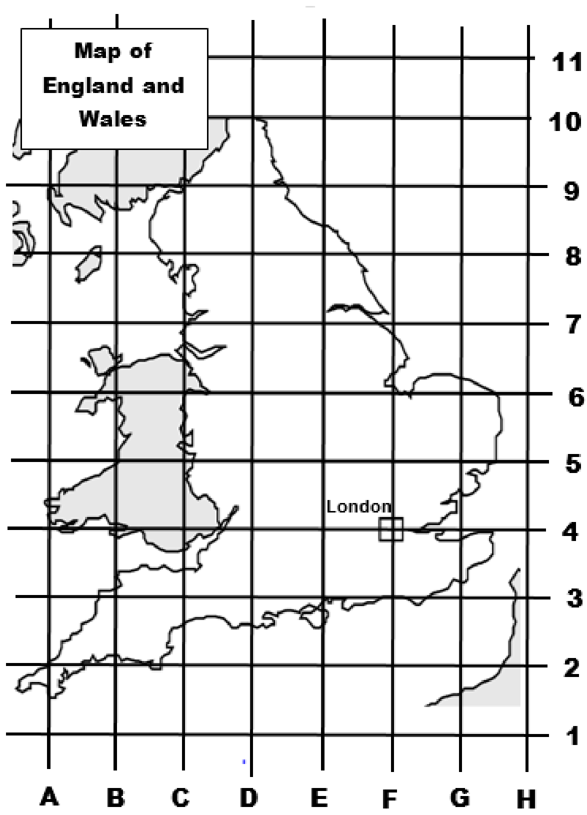
eg The map below shows four campsites A, B, C, D. Some campers decide to stay overnight at the campsite grid reference 115240. The next day they move to campsite grid reference 128255.

Draw a line to show the route they take. (Answer shown as arrow)



➢ identify alpha numeric coordinates

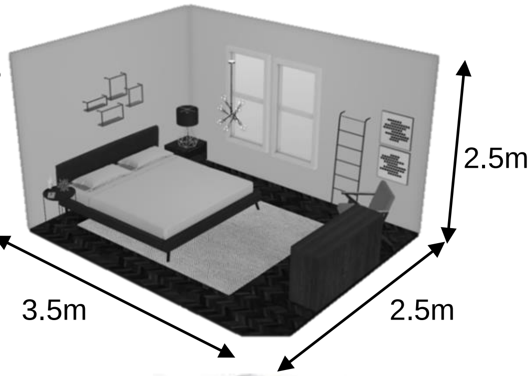
eg A pilot flies from a point A2 (Cornwall) to London and then to point C7 (Liverpool)
Draw his route on the map.
In which direction must he fly from A2 to London? (North west)
- From London to C7 (North east)



20. Understand and use common 2-D representations of 3-D objects

- Understand drawings and plans

eg The drawing shows a bedroom



What is the area of the wall behind the bed?
2.5 x 2.5 = **6.25m²**
What is the area of the floor?
2.5 x 3.5 = **8.75m²**
What is the volume of the room?
2.5 x 2.5 x 3.5 = **21.875m³**

eg What is the approximate volume of this drinks can?

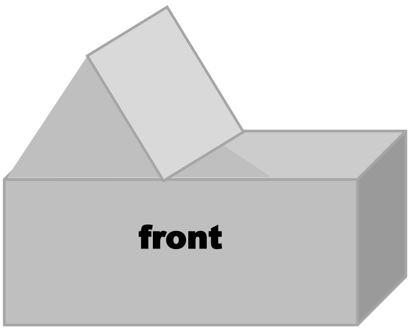
$V = \pi r^2 h$

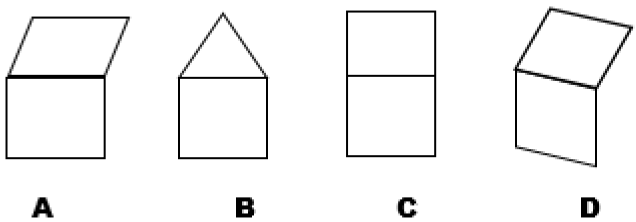
$V = \pi \times 3.25^2 \times 11$
$= \mathbf{365cm^3}$

21. Draw 3-D shapes to include plans and elevations

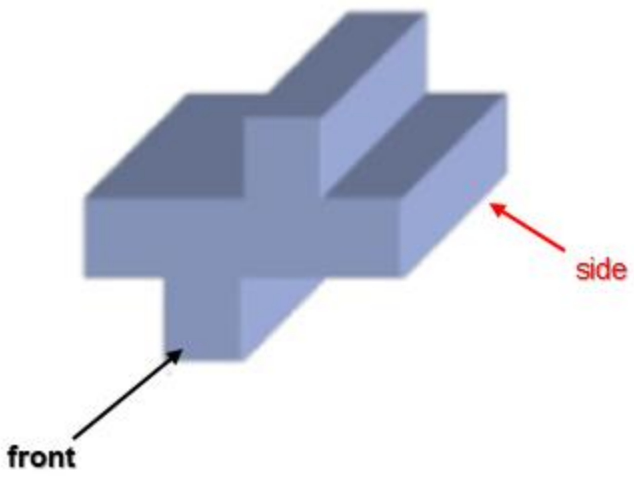
- recognise given plans and elevations

eg Which one of the sketches shows the elevation of the left side of the building? (Answer C)

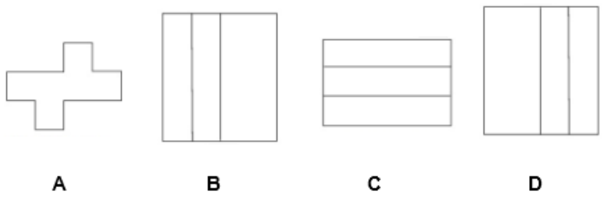




- Candidates should understand that co-ordinates can be presented, or written in horizontal and vertical formats eg The diagram shows a cross section of a metal bar.



Which one of the following is the **side elevation**? (Answer C)



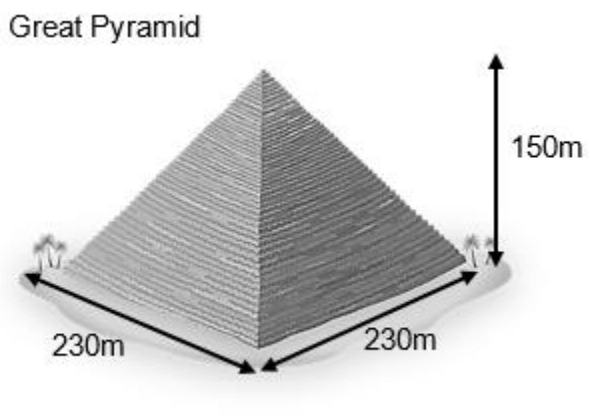
Candidates should be able to apply underpinning knowledge about the properties of shapes (see p24f) and angles (p35ff) in this context.

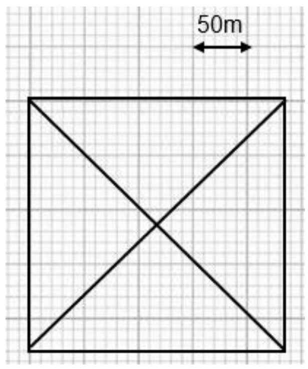
Eg: (-2, 1) is the same as $(-2, 1)$

- draw top view plans from drawings and sketches

  eg the drawing shows one of the Great Pyramids

  .Draw a top plan view of the Pyramid

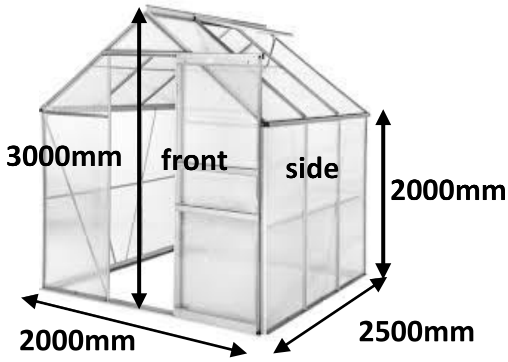


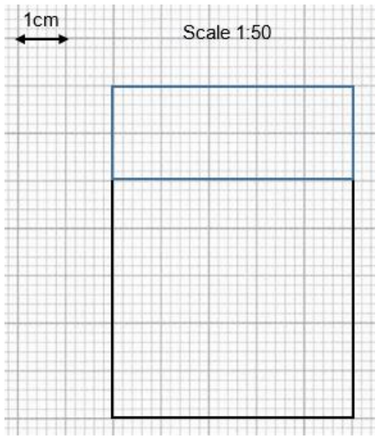


- draw elevations from drawings and sketches

  eg the drawing shows a greenhouse

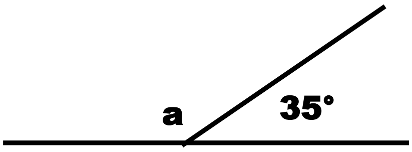
  Draw a side elevation of the greenhouse



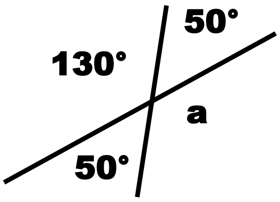


22. Calculate values of angles and/or coordinates with 2-D and 3-D shapes

- calculate with reference to standard angles: right angle 90º; straight line 180º; point 360º

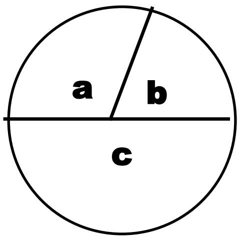


eg straight line 180°
a + 35 = 180
a = 145°



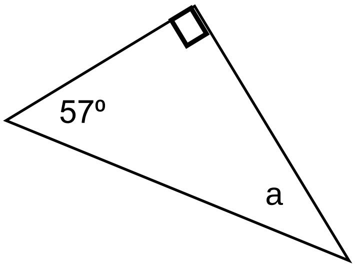
eg angles round a point 360°
a + 50 + 130 + 50 = 360
a = 130°

eg opposite angles are equal

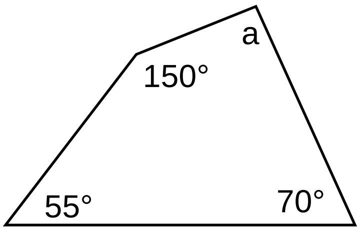


eg angles round a point 360°
eg application in pie chart
a + b + c = 360°

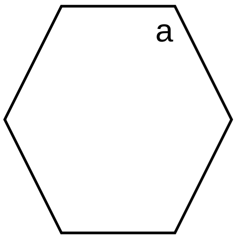
- calculate with reference to **interior** angles of standard 2-D shapes: triangle 180º; quadrilateral (4 sides – 2) x 180 = 360º; pentagon (5 sides – 2) x 180 = 540º; hexagon (6 sides – 2) x 180 = 720º



eg angles in triangle add up to 180°
a + 57 + 90 = 180
a = 33°

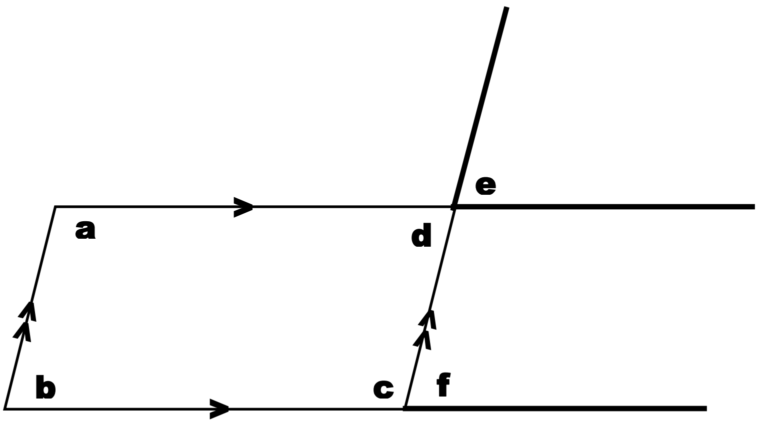


eg angles in quadrilateral add up to 360°
a + 150 + 55 +70 = 360
a = 85°



eg angles in regular hexagon add up to (6-2) x 180 = 720°
a = 720 ÷ 6 = 120°

- calculate angles with reference to parallel lines



a+b+c+d = 360º
(angles in quadrilateral)

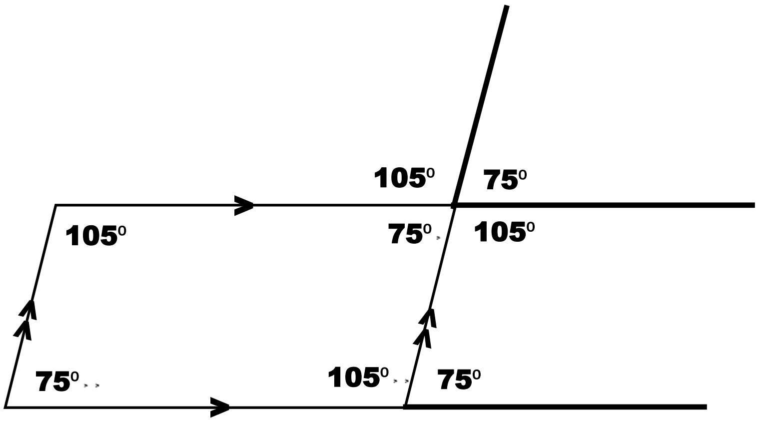
c+f = 180º (straight line)

c+d = 180º and
a+b = 180º and
a+d = 180º and
b+c = 180º (interior angles)

e = d (opposite angles)

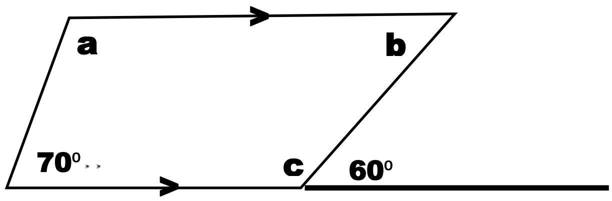
e = f (corresponding angles)

eg



- calculate angles using combinations of above

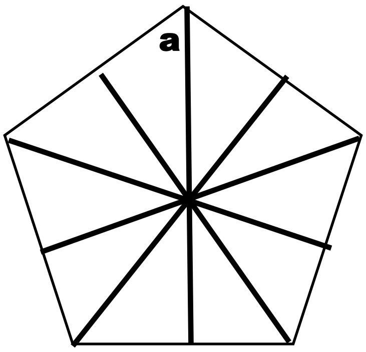
  eg calculate angles a, b, c



a = 110º
b = 60º
c = 120º

check 110+60+120+70 = 360

eg the diagram shows a regular polygon
calculate angle a



a = 54 º

23. Calculate the median and mode of a set of quantities

- calculate median (odd number of data)

  eg the table shows the price of petrol in petrol stations in a town

Petrol prices per litre (p)								
118.9	121.9	119.9	116.9	129.9	117.9	119.9	115.9	116.9

Work out the median price for one litre of petrol:
115.9 116.9 116.9 117.9 **118.9** 119.9 119.9 121.9 129.9
Answer 118.9p

- calculate median (even number of data)

  eg the table shows the annual pay of a company's workers

Workers annual pay (£)
23500
18900
28900
24750
19300
39780
19250
22590

Work out the median pay for the company.

18900 19250 19300 **22590** **23500** 24750 28900 39780

$$median = \frac{22590 + 23500}{2} = 23045$$

Answer £23045

- calculate mode

  eg a company sends letters by post.

  The table shows the weights of the letters sent this week.

Weight of letters in grams(g)				
24.4	25.5	25.0	25.3	24.4
26.5	25.5	24.9	24.4	25.5
25.5	25.1	25.5	24.2	24.5

What is the modal value for the weight of the letters?

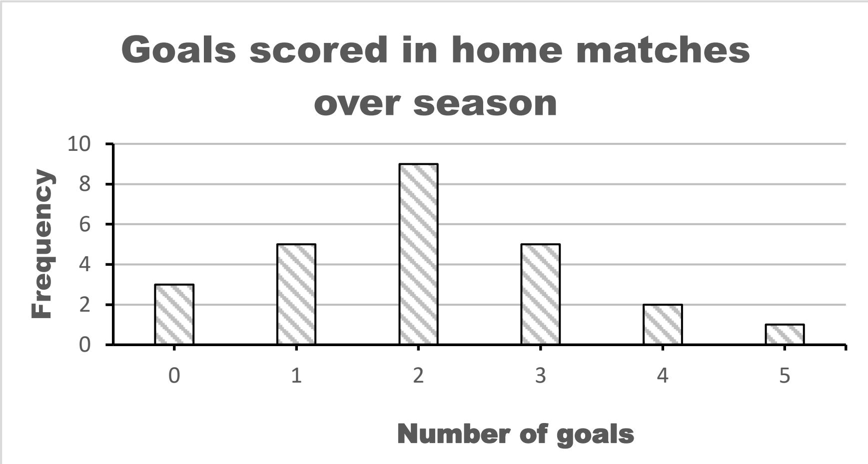
Weight	Tally	Weight	Tally
24.4	III	26.5	I
25.5	**~~IIII~~**	24.9	I
25	I	25.1	I
25.3	I	24.2	I
		24.5	I

Answer 25.5g

24. Estimate the mean of a grouped frequency distribution from discrete data

- find mean from grouped data in a chart

  eg find the mean number of goals scored in each match



Goals scored (x)		Frequency (f) (ie number of times)	**Answer** Calculate fx's and n then mean = ∑fx/n	
0	x	3	= 0	
1	x	5	= 4	
2	x	9	=18	
3	x	5	=15	mean = 51÷ 25 = **2.04** (goals per match)
4	x	2	=8	
5	x	1	=5	
6 or more	x	0	=0	
		25	51	

- find mean from grouped data in a table
- understand format eg 63 < g ≤ 65 may be interpreted as (a weight in) g is between 63g and 65g in order to determine a mid point $\frac{63 + 65}{2} = 64$g

  eg estmate the mean weight of these large eggs

Weights of large eggs		**Answer** Calculate midpoints, then fx's and n then mean = ∑fx/n			
Weight in grams	**Number of eggs**				
63 < g ≤ 65	22	x	64	=1408	
65 < g ≤ 67	27	x	66	=1782	
67 < g ≤ 69	26	x	68	=1768	mean = $6728 \div 100 =$ **67.28g**
69 < g ≤ 71	15	x	70	=1050	
71 < g ≤ 73	10	x	72	= 720	
	100			6728	

25. Use mean, median, mode and range to compare 2 sets of data.

- calculate averages: mean, median, mode
- choose the most suitable average to use and explain choice
  eg when comparing a given result, use the same average as the given result understand eg median is considered better average to use (than mean) if data is skewed or there are outliers
  eg mean is the average of choice when data is evenly distributed (not skewed, no outliers) because it takes account of all the data
  eg mode is best reserved for category (non-continuous data) and should not be used with very small data sets
- calculate range and understand that range is a measure of the consistency or variation of data
- explain comparisons using figures

eg An events organiser knows that the site she used last year (Site A) has average (mean) sunshine in June of 215 hours with a range of 99 hours.
She considers two other sites (Site B and Site C) and finds the following information.

Total hours of sunshine in June		
	Sunshine (hours)	
Year	**Site B**	**Site C**
2008	213.70	192.70
2009	224.20	193.60
2010	265.00	198.80
2011	187.70	182.90
2012	282.70	244.50
2013	151.60	136.50
2014	158.40	141.70
2015	239.10	188.50
2016	169.50	151.90
2017	248.00	164.50
2018	194.650	197.30
2019	245.50	215.10

She wants a site with the best chance of sunshine.
Which Site would be best for her? Explain your answer.

Site A given mean = 215 hours and range 99 hours.
Need to compare means and range.

Site B mean = 2580.00 ÷ 12 = 215 range = 282.7 – 151.6 = 131.1
Site C mean = 2208.00 ÷ 12 = 184 range = 244.5 – 136.5 = 108

She should stay with Site B because site C has lower mean sunshine. Sites A and B have the same average sunshine but Site A has lower range which is more consistent.

(Candidates are not expected to give such a detailed explanation, but could explain in terms of eg 215 hours is same for A and B, 184 (C) is less AND A has lower range than B, so less variation)

eg A team manager has three players selected for the next match.

Player	**Average score (median) over last eight matches**	**Range of scores over last eight matches**
Archie	**105**	**26**
Baz	**101**	**37**
Cathy	**99**	**32**

She needs one more player to make up the team.
She looks at the scores of two more players.

Scores in last eight matches	
Dave	**Elaine**
78	**87**
48	**98**
102	**101**
98	**84**
84	**93**
101	**79**
67	**87**
96	**97**

She wants the best and most consistent scorer.
Which player should the team manager select? Explain your answer.
Find median as the other players' averages are medians

Dave median: 48 67 78 **84 96** 98 101 102 $\frac{84+96}{2}$ = **90**

range = 102 – 48 = **54**

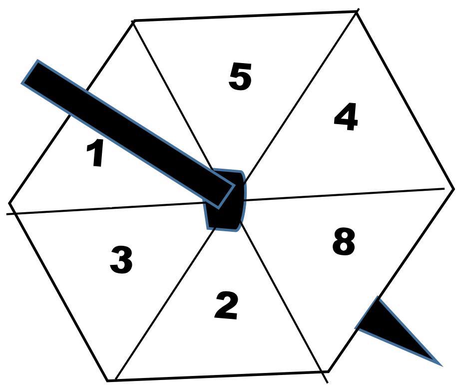
Elaine median 79 84 87 **87 93** 97 98 101 $\frac{87+93}{2}$ = **90**

range = 101 – 79 = **22**

I would choose Elaine because the averages are equal 90 but Elaine's range 22 is lower than Dave's 54. Elaine has more consistency.

26. Work out the probability of combined events including the use of diagrams and tables including two-way tables

- work out the probability of combined events using a table
  eg what is the probability that two consecutive of this spinner will score more than 10? Give your answer as a fraction.



Note firstly 6 and 7 are missing
So the only way of getting **more** than ten is if 8 is one of the throws

There are 36 possibilities (6 x 6) for spinning twice, only when 8 and a 3 or more are spun will the total be more than 10, ie there are 7 possibilities:

		first spin					
		1	2	3	4	5	8
second spin	1	x	x	x	x	x	x
	2	x	x	x	x	x	x
	3	x	x	x	x	x	11
	4	x	x	x	x	x	12
	5	x	x	x	x	x	13
	8	x	x	11	12	13	16

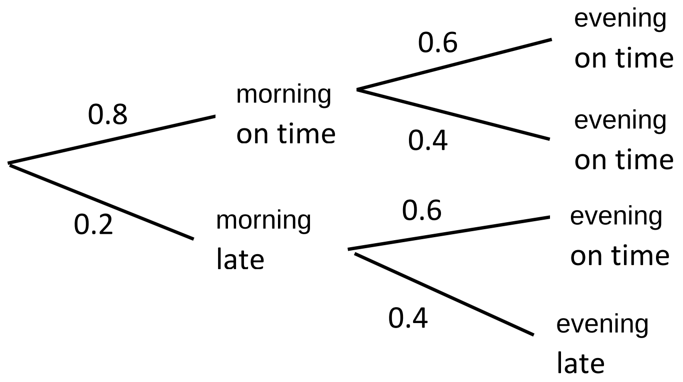
Answer $\frac{7}{36}$

- work out the probability of combined events using a diagram

  eg A commuter travels every day by train from Leeds to Halifax in the morning and returns in the evening,
  The train company publishes data for train time arrivals.

	On time (%)	
	Morning	Evening
Leeds to Halifax	80%	75%
Halifax to Leeds	90%	60%

What is the probability that, on one day, the commuter's train will be **late** both in the morning and in the evening? Give your answer as a decimal. Show your working as a tree diagram.

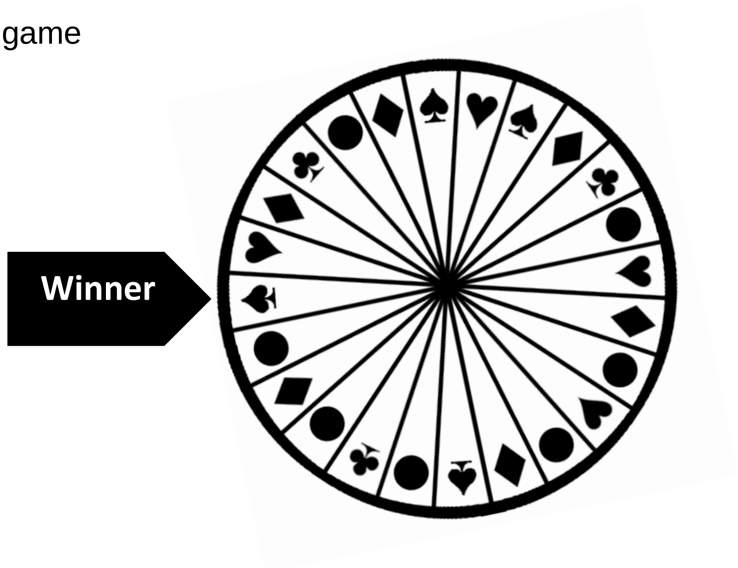


Probability of both being late
= 0.2 x 0.4
= 0.8 Answer

27. Express probabilities as fractions, decimals and percentages

- calculate probabilities of events as fractions

Spinning wheel game



eg If the wheel is spun again what is the chance of ♣ being the winner? Give your answer as a fraction in its simplest form.

of 24 sections; 3 are ♣s

$\frac{3}{24} = \frac{1}{8}$ **Answer**

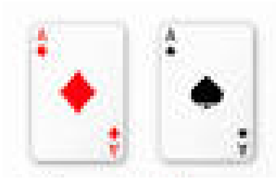
eg What is the probability of spinning a ♦ and a ♣ in consecutive spins. Give your answer as a fraction in its simplest form.

♦= $\frac{6}{24} = \frac{1}{4}$ ♣= $\frac{1}{8}$

$\frac{1}{4} x \frac{1}{8} = \frac{1}{32}$ **Answer**

- calculate probabilities of events as percentages
- eg A pack of cards contains 52 cards including four aces

A player takes two cards at random from the pack.They are both aces.

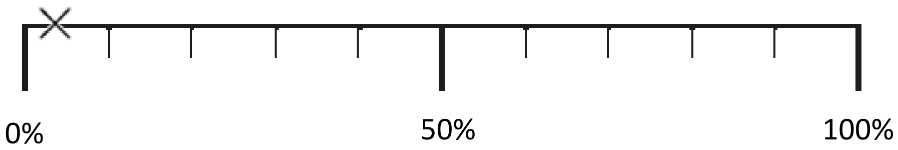


The player takes another card from the pack at random.

What is the percentage probability that this card will also be an ace? Show your answer in the diagram

There are 50 cards left, two of them will be the remaining aces.

Probability = $\mathbf{\frac{2}{50} = \frac{4}{100} = 4\%}$



eg Members of a studio audience are asked to rate a new programme on a 3 point scale: like, dislike, not sure. The results are shown in the table below.

age	**like**	**dislike**	**not sure**
under 20	10	30	0
20 - 30	25	8	7
over 30	26	5	9

A researcher picks a member of the audience at random.
What is the probability that the audience member will be under 20 and dislike the programme?

Give your answer as a decimal
Total number of audience members = 120
Under 20 dislikes = 30
Probability = $30 \div 120$ = **0.25 Answer**

28. Draw and interpret scatter diagrams and recognise positive and negative correlation

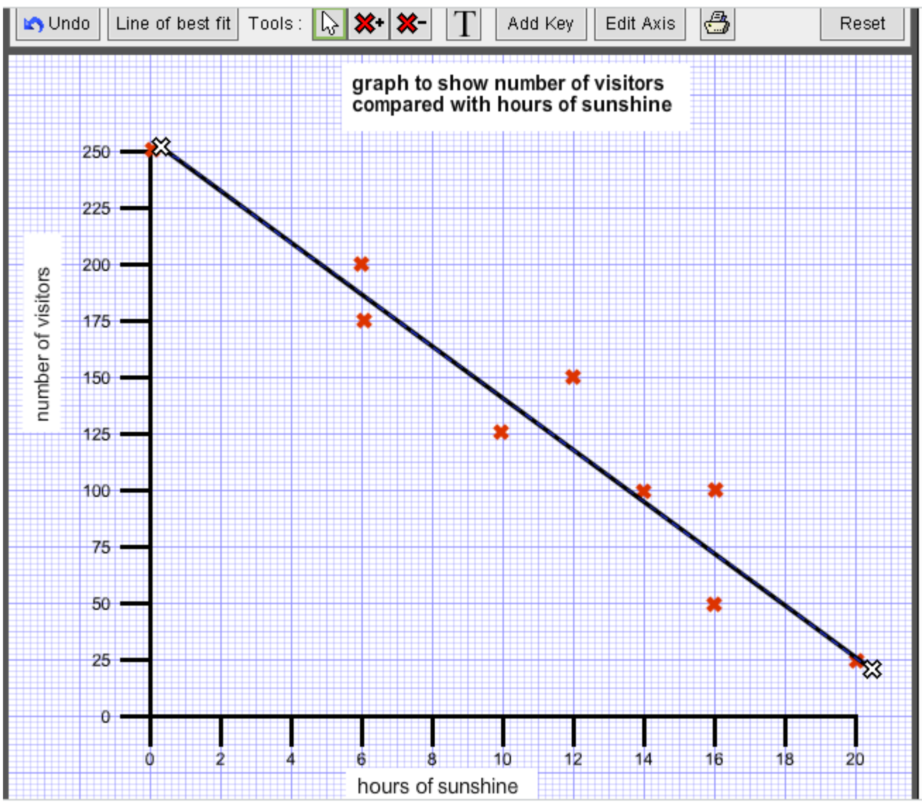
Note: candidates should also be familiar with all other graphical presentations specified at lower levels eg bar charts, pie charts, tally charts, line graphs

- draw and label scatter diagrams (scatter graphs)
- recognise and explain negative correlation Ie y axis decreases as x axis increases .

eg The Aquarium is an indoor attraction at a seaside town. The table shows the number of visitors at weekends during July and August and the hours of sunshine recorded

Visitors to the Aquarium - weekends July and August									
hours of sunshine	12	0	16	6	16	20	14	10	6
number of visitors	150	250	50	200	100	25	100	125	175

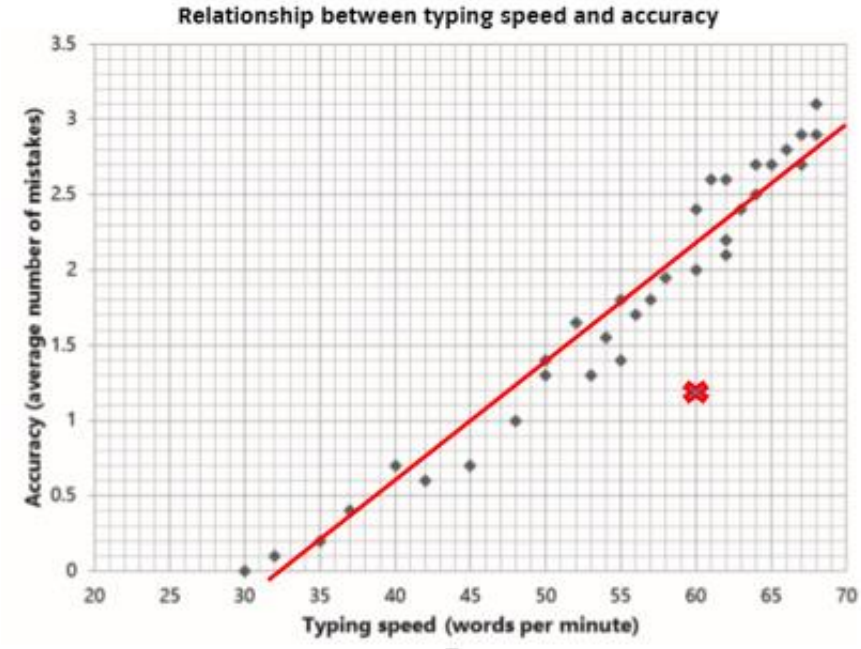
Draw a suitable graph to compare the number of visitors to The Aquarium compared to the hours of sunshine. Explain what your graph shows.



Candidates are expected to draw a trend line (line of best fit) to complete the scatter graph without being instructed to do so. It should be drawn so that there are approximately the same number of plots either side of the trend line.
The explanation (of negative correlation) should include a reference to the number of visitors (y axis) decreasing as the hours of sunshine (x axis) increase.

- add trend line to and analyse scatter diagrams
- recognise and understand positive correlation y axis increases as x axis increases

eg The graph shows data about typing speeds and the average number of typing errors made in tests for job applicants.



Add a trend line to the graph. Explain what the trend line shows.
Trend line added shown in red – candidates are expected to draw a straight line through points, so that there are approximately the same number of plots either side of the trendline The explanation (of positive correlation) should include a reference to the number of mistakes increasing (y axis) as the typing speed increases.(x axis).

An office employs a typist who makes an average 1.5 mistakes at a typing speed of 60 words per minute. Add this plot to the graph. Is the typist better, worse or about the same as the average? Explain your answer.
The plot is shown in red. The explanation should recognise that the typist is better than average and should include reference to the plot being below the trend line, which means the typist makes fewer mistakes at 60wpm than average (see also p11 point 8.3).

Appendix 2 City and Guilds Test specification 4748-120 and 4748-220

Total 60 marks Time 1 hour 45 minutes (Section 1 - 25 minutes, Section 2 - 1 hour 20 minutes)					
	Total marks	**Calculator (75%)**	**Non-calculator (25%)**	**Underpinning skills (25%)**	**Problem solving (75%)**
Section 1 Non-calculator	**15**	*0*	*15*	*10*	*5*
Section 2 Calculator	**45**	*45*	*0*	*5*	*40*
Totals	**60**	*45*	*15*	*15*	*45*

Level 2 Subject Content Coverage
23-25 of the 28 numbered content statements must be covered in each assessment version (ie 82-89%)
(need at least 75% of numbered SCS from each content area)
100% of numbered statements must be covered over every three assessment versions

Must meet 100% of the problem-solving bullet points across the test
All problem solving questions should contain attributes A and C.

** A Task has little or no scaffolding; there is little guidance given to the student beyond a start point and a finish point. Question does not explicitly state the mathematical process(es) required for the solution*
** C *Information not given in mathematical form or in mathematical language; or there is a need for resuls to be interpreted or methods evaluated, eg in a real world context*.
(p19 DfESubject Content Functional Skills Mathematics)

Appendix 3 Specifications for lower levels (subsumed in Level 2)

Note: numbers refer to subject content specifications (SCS) in DfE Subject Content

Using numbers and the number system			
Entry Level 1 ***whole numbers***	**Entry Level 2** ***whole numbers, fractions and decimals***	**Entry Level 3** ***whole numbers, fractions and decimals***	**Level 1** ***whole numbers, fractions, decimals and percentages***
1.Read, write, order and compare numbers up to 20	2. Read, write, order and compare numbers up to 200	1. Count, read, write, order and compare numbers up to 1000	1. Read, write, order and compare large numbers (up to one million)
2.Use whole numbers to count up to 20 items including zero	1. Count reliably up to 100 items 3. Recognise and sequence odd and even numbers up to 100	6. Recognise and continue linear sequences of numbers up to 100	2. Recognise and use positive and negative numbers
4. Recognise and interpret the symbols +, – and = appropriately	4. Recognise and interpret the symbols +, – , x, ÷ and = appropriately		
3.Add numbers which total up to 20, and subtract numbers from numbers up to 20	5. Add and subtract two-digit numbers	2. Add and subtract using three-digit whole numbers	
	6. Multiply whole numbers in the range 0x0 to 12x12 (times tables)	4. Multiply two-digit whole numbers by single and double digit whole numbers	4. Use multiplication facts and make connections with division facts 6. Calculate the squares of one-digit and two-digit numbers

	8. Divide two-digit whole numbers by single-digit whole numbers and express remainders	3. Divide three-digit whole numbers by single and double digit whole numbers and express remainders	3. Multiply and divide whole numbers and decimals by 10, 100, 1000
	9. Approximate by rounding to the nearest 10, and use this rounded answer to check results	5. Approximate by rounding numbers less than 1000 to the nearest 10 or 100 and use this rounded answer to check results	12. Approximate by rounding to a whole number or to one or two decimal places
	10. Recognise simple fractions (halves, quarters and tenths) of whole numbers and shapes	7. Read, write and understand thirds, quarters, fifths and tenths including equivalent forms	8. Read, write, order and compare common fractions and mixed numbers
			9. Find fractions of whole number quantities or measurements
	11. Read, write and use decimals to one decimal place	8. Read, write and use decimals up to two decimal places	10. Read, write, order and compare decimals up to three decimal places
		9. Recognise and continue sequences that involve decimals	11. Add, subtract, multiply and divide decimals up to two decimal places
			13. Read, write, order and compare percentages in whole numbers
			14. Calculate percentages of quantities, including simple percentage increases and decreases by 5% and multiples thereof
			15. Estimate answers to calculations using fractions and decimals

			16. Recognise and calculate equivalences between common fractions, percentages and decimals
			17. Work with simple ratio and direct proportions
			5. Use simple formulae expressed in words for one or two-step operations
			7. Follow the order of precedence of operators

Using common measures, shape and space			
5. Recognise coins and notes and write them in numbers with the correct symbols (£ & p), where these involve numbers up to 20	12. Calculate money with pence up to one pound and in whole pounds of multiple items and write with the correct symbols (£ or p)	10. Calculate with money using decimal notation and express money correctly in writing in pounds and pence 11. Round amounts of money to the nearest £1 or 10p	18. Calculate simple interest in multiples of 5% on amounts of money 19. Calculate discounts in multiples of 5% on amounts of money
6. Read 12 hour digital and analogue clocks in hours	13. Read and record time in common date formats, and read time displayed on analogue clocks in hours, half hours and quarter hours, and understand hours from a 24-hour digital clock	12. Read, measure and record time using am and pm	
7. Know the number of days in a week, months, and seasons in a year. Be able to name and sequence	7. Know the number of hours in a day and weeks in a year.	13. Read time from analogue and 24-hour digital clocks in hours and minutes	
8. Describe and make comparisons in words between measures of items including size,	14. Use metric measures of length including millimetres, centimetres, metres and kilometres	15. Compare metric measures of length including millimetres, centimetres, metres and kilometres	22. Calculate the area and perimeter of simple shapes including those that are made up of a combination of rectangles

length, width, height, weight and capacity			
	15. Use measures of weight including grams and kilograms	14. Use and compare measures of length, capacity, weight and temperature using metric or imperial units to the nearest labelled or unlabelled division	23. Calculate the volumes of cubes and cuboids
		16. Compare measures of weight including grams and kilograms	20. Convert between units of length, weight, capacity, money and time, in the same system
	16. Use measures of capacity including millilitres and litres	17. Compare measures of capacity including millilitres and litres	
	17. Read and compare positive temperatures		
	18. Read and use simple scales to the nearest labelled division	18. Use a suitable instrument to measure mass and length	21. Recognise and make use of simple scales on maps and drawings
9. Identify and recognise common 2-D and 3-D shapes including circle, cube, rectangle (including square) and triangle	19. Recognise and name 2-D and 3-D shapes including pentagons, hexagons, cylinders, cuboids, pyramids and spheres	19. Sort 2-D and 3-D shapes using properties including lines of symmetry, length, right angles, angles including in rectangles and triangles	24. Draw 2-D shapes and demonstrate an understanding of line symmetry and knowledge of the relative size of angles

	20. Describe the properties of common 2-D and 3-D shapes including numbers of sides, corners, edges, faces, angles and base		25. Interpret plans, elevations and nets of simple 3-D shapes
10. Use everyday positional vocabulary to describe position and direction including left, right, in front, behind, under and above	21. Use appropriate positional vocabulary to describe position and direction including between, inside, outside, middle, below, on top, forwards and backwards	20. Use appropriate positional vocabulary to describe position and direction including eight compass points and including full/half/quarter turns	26. Use angles when describing position and direction, and measure angles in degrees

Handling information and data

Entry Level 1	**Entry Level 2**	**Entry Level 3**	**Level 1**
11. Read numerical information from lists	22. Extract information from lists, tables, diagrams and bar charts	21. Extract information from lists, tables, diagrams and charts and create frequency tables	
	23. Make numerical comparisons from bar charts	22. Interpret information, to make comparisons and record changes, from different formats including bar charts and simple line graphs	
12. Sort and classify objects using a single criterion	24. Sort and classify objects using two criteria		

13. Read and draw simple charts and diagrams including a tally chart, block diagram/graph	25. Take information from one format and represent the information in another format including use of bar charts	23. Organise and represent information in appropriate ways including tables, diagrams, simple line graphs and bar charts	27. Represent discrete data in tables, diagrams and charts including pie charts, bar charts and line graphs
			28. Group discrete data and represent grouped data graphically
			29. Find the mean and range of a set of quantities
			30. Understand probability on a scale from 0 (impossible) to 1 (certain) and use probabilities to compare the likelihood of events
			31. Use equally likely outcomes to find the probabilities of simple events and express them as fractions

<table>
<tr><th colspan="4">Solving mathematical problems and decision making</th></tr>
<tr>
<td>Entry Level 1
use the knowledge and skills listed above to recognise a simple mathematical problem and obtain a solution.
A simple mathematical problem is one which requires working through one step or process
and
which draws upon knowledge and/or skills from one mathematical content area</td>
<td>Entry Level 2
use the knowledge and skills listed above to recognise a simple problem and obtain a solution.
A simple problem is one which requires working through one step or process
and
which draws upon knowledge and/or skills from one mathematical content area</td>
<td>Entry Level 3
use the knowledge and skills listed above to recognise a simple problem and obtain a solution.
A simple problem is one which requires working through one step or process.
and
which draws upon knowledge and/or skills from one mathematical content area</td>
<td>Level 1
use the knowledge and skills listed above to recognise and obtain a solution or solutions to a straightforward problem.
A straightforward problem is one that requires students to either work through one step or process or to work through more than one connected step or process
and
some of which draw upon a combination of any two of the mathematical content areas and require students to make connections between those content areas</td>
</tr>
<tr>
<td rowspan="3">• Use given mathematical information and recognise and use simple mathematical terms appropriate to Entry Level 1</td>
<td>Use given mathematical information including numbers, symbols, simple diagrams and charts</td>
<td>• Use given mathematical information including numbers, symbols, simple diagrams and charts</td>
<td></td>
</tr>
<tr>
<td rowspan="2">Recognise, understand and use simple mathematical terms appropriate to Entry Level 2</td>
<td>• Recognise, understand and use simple mathematical terms appropriate to Entry Level 3</td>
<td>• Read, understand and use mathematical information and mathematical terms used at this level</td>
</tr>
<tr>
<td></td>
<td>Address individual problems as described above</td>
</tr>
</table>

• Use the methods given above to produce, check and present results that make sense	Use the methods given above to produce, check and present results that make sense	• Use the methods given above to produce, check and present results that make sense to an appropriate level of accuracy	Use knowledge and understanding to a required level of accuracy Analyse and interpret answers in the context of the original problem Check the sense, and reasonableness, of answers
• Provide a simple explanation for those results	Present appropriate explanations using numbers, measures, simple diagrams, simple charts and symbols appropriate to Entry Level 2	• Present results with appropriate and reasoned explanation using numbers, measures, simple diagrams, charts and symbols appropriate to Entry Level 3.	Present results with appropriate explanation and interpretation demonstrating simple reasoning to support the process and show consistency with the evidence presented
The context for simple problems at this level should be familiar to all students and easily described.	*The context for simple problems at this level should be familiar to all students and easily described.*	*The context for simple problems at this level should be familiar to all students.*	*The context of individual problems at this level will require some comprehension in order for the student to be able independently to identify and carry out an appropriate mathematical approach.*

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About City & Guilds

Since 1878 we have worked with people, organisations and economies to help them identify and develop the skills they need to thrive. We understand the life changing link between skills development, social mobility, prosperity and success. Everything we do is focused on developing and delivering high-quality training, qualifications, assessments and credentials that lead to jobs and meet the changing needs of industry.

We work with governments, organisations and industry stakeholders to help shape future skills needs across industries. We are known for setting industry-wide standards for technical, behavioural and commercial skills to improve performance and productivity. We train teams, assure learning, assess cohorts and certify with digital credentials. Our solutions help to build skilled and compliant workforces.