Essential Skills Northern Ireland (4800)

Application of Number external assessments at levels 1 and 2

Guidance for delivery

Version 1.0   June 2017

City & Guilds | Maths & English

About City & Guilds

As the UK's leading vocational education organisation, City & Guilds is leading the talent revolution by inspiring people to unlock their potential and develop their skills. City & Guilds is recognised and respected by employers across the world as a sign of quality and exceptional training.

City & Guilds Group

The City & Guilds Group operates from three major hubs: London (servicing Europe, the Caribbean and Americas), Johannesburg (servicing Africa), and Singapore (servicing Asia, Australia and New Zealand). The Group also includes the Institute of Leadership & Management (management and leadership qualifications), City & Guilds Licence to Practice (land-based qualifications) and Learning Assistant (an online e-portfolio).

Copyright

Please note: the Essential Skills qualification and subject criteria (on which these qualifications are based) are published by the Northern Ireland Council for the Curriculum, Examinations and Assessment (CCEA) Regulation function.

City & Guilds
1 Giltspur Street
London EC1A 9DD
cityandguilds.com

Contents

1   About this guide

This guide has been produced to help Essential Skills tutors and curriculum managers understand the structure, content and mark allocations within City & Guilds' Essential Skills Application of Number external assessments at levels 1 and 2.

It should be read in conjunction with
- the qualification specifications, as set out in Section 5 of our **Essential Skills qualifications handbook**
- our **periodic examiner reports**.

Both of these can be found on the **Essential Skills (4800) qualification documents webpage**.

Relationship between the Essential Skills standards and curriculum vs the qualifications' criteria and specifications

When preparing candidates for assessment, it is important to appreciate the distinction between the Department for the Economy (DfE) Essential Skills Standards and Curriculum versus the regulatory and assessment criteria for the Essential Skills qualifications.

The Standards and Curriculum document sets out the range of skills, knowledge and understanding expected to be **taught** and **learned** at each level; whereas the Essential Skills qualification and subject criteria set out the skill standards, coverage and range expected of candidates undergoing **assessment** in these qualifications.

The Essential Skills qualification and subject criteria were devised by CCEA Regulation, and are **common to all awarding organisations' Essential Skills qualifications**. Whilst the technical content and demand of these criteria align with the Standards and Curriculum, it is important to bear in mind that the Essential Skills qualifications also require candidates to demonstrate **application** of literacy and numeracy within purposeful contexts.

The qualification and assessment specifications (in Section 5 of our Essential Skills qualifications handbook) are taken directly from the CCEA Regulation qualification and subject criteria.

Assessment model

All aspects of Essential Skills Application of Number at levels 1 and 2 are externally assessed by City & Guilds. This is a summative exam-type assessment, and should only be attempted by candidates once they have completed a period of learning and assessment preparation. The latter might include attempting one or more sample papers and/or making use of centre devised activities that reflect the demands and rigours of the live assessments.

2   Application of Number assessments – key principles

The Application of Number subject criteria for both Level 1 and Level 2 consist of three process **skill standards**:

- represent
- calculate
- interpret.

An approximately equal weighting of marks applies to each skill standard:

Represent:

Find information / data needed to solve problems, decide methods

30-40%

Calculate:

Carry out calculations, check results

30-40%

Interpret:

Present and explain results, review task

30-40%
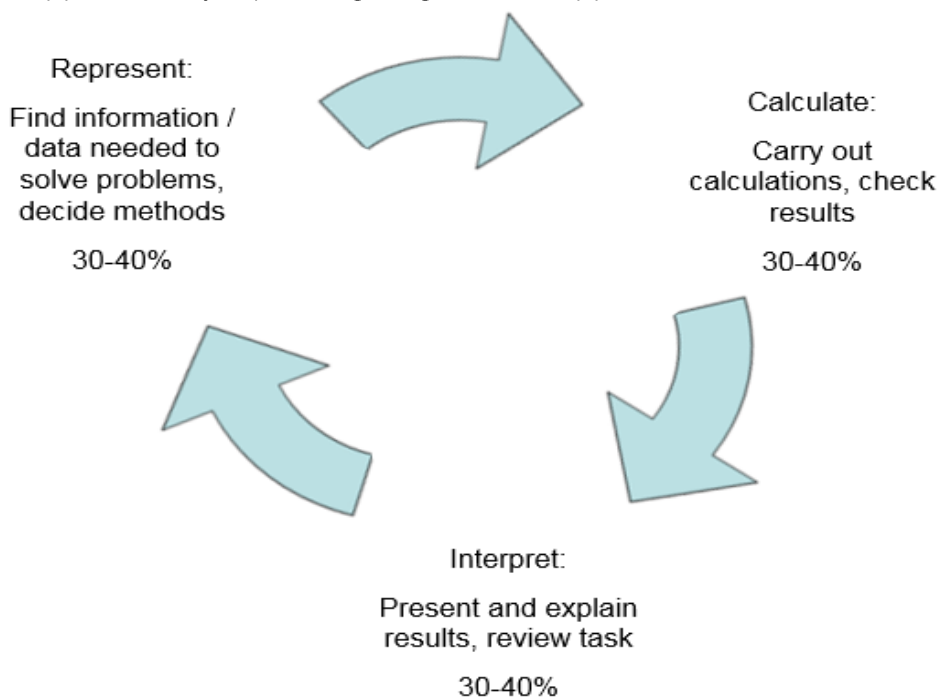
The assessments are scenario-based, requiring candidates to apply all three process skills to a given problem (similar to the 'plan, do, review' cycle that existed within the action-based activity for the previous Essential Skills qualifications).

It is important to remember the Level 1 and Level 2 qualifications are titled **Application of Number** (rather than 'Numeracy'). As well as doing calculations; candidates must also be able to show they can make choices about the data required to solve a task, plan suitable approaches and decide which methods to use. They also need to be able to present and explain their results.

Only about a third of the available marks relate directly to carrying out calculations; the other two thirds relate to representing and interpreting.

The scenario topics are not specific to any particular vocational area, although are designed to be accessible to learners across a range of settings.

Alongside the skill standards, the **coverage and range** sets out the technical mathematical content assessed at each level. This aligns broadly with the DfE Essential Skills Standards and Curriculum.

Assessment preparation

Candidates should be given plenty of opportunity to familiarise with the Application of Number external assessment at the level they are working towards before being entered for the live assessment. This might include attempting one or more sample papers and/or making use of centre-devised activities that reflect similar demands and rigours.

The live assessment is delivered on paper, although candidates may use relevant technology in the course of completing it (as long as their work is printed out and attached to the question/answer booklet).

When completing their live assessments, candidates must answer in the spaces provided within the question/answer booklet (or attach printouts of any work produced electronically, clearly labelled), and are advised to show all of their working. They will need rulers and calculators in order to be successful in some of the tasks (NB: the Essential Skills qualifications handbook provides further guidance on the range of permitted/prohibited equipment).

Some candidates lose marks by not reading all of the instructions carefully, including the introduction to the task. The tasks are holistic in nature and it is important that candidates grasp the overall problem set and follow instructions carefully.
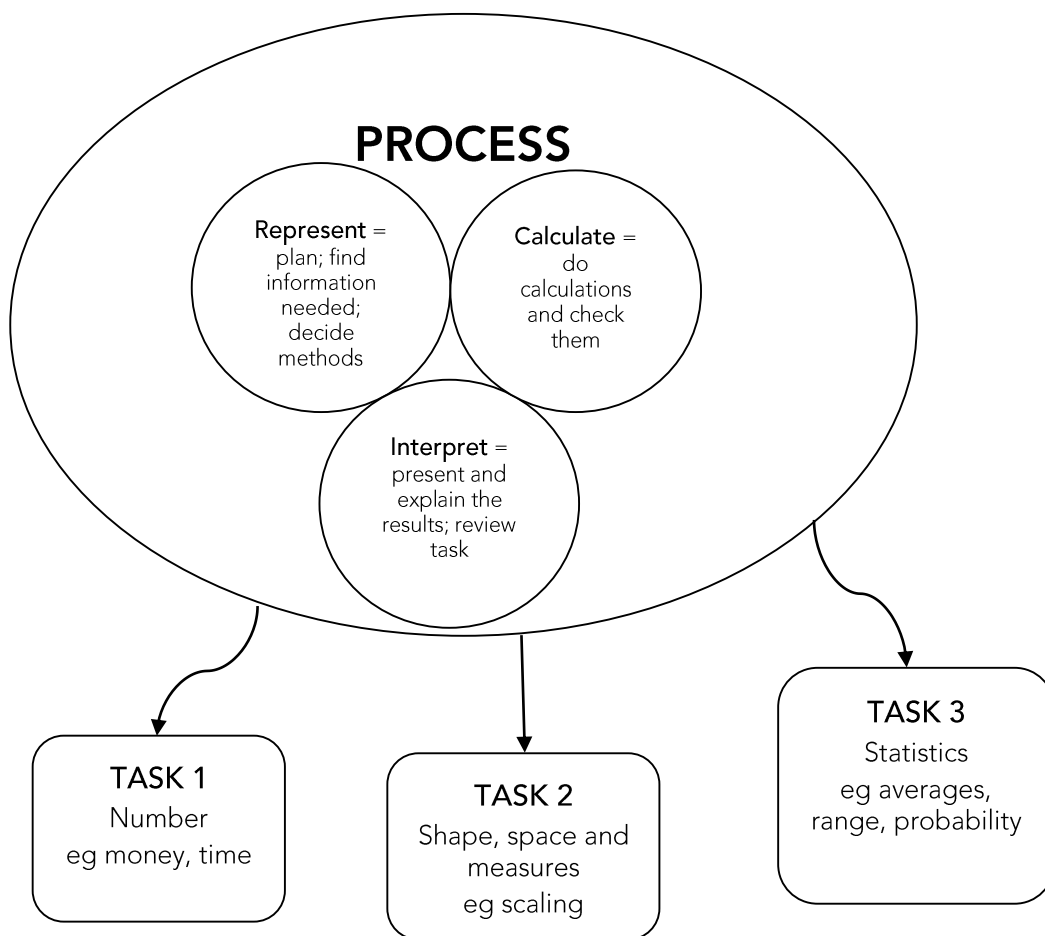
3 Essential Skills Application of Number at Level 1
3.1 Structure of assessment

The assessment comprises **three** holistic tasks, each covering one of the following technical content areas:

- number
- shape, space and measure
- handling data and statistics.

Each task also addresses all three process skills: **represent, calculate** and **interpret** (see Section 2).

The tasks may be attempted in any order, although candidates should plan to spend a roughly equal amount of time on each one. Candidates should be encouraged to read through each task carefully, ensuring they have understood the scenario and each of the things they are expected to do.

3 Essential Skills Application of Number at Level 1

3.2 Represent (finding information, methodology)

Finding information

Information will be found in the introduction to a task, the text in the question itself, in table format and in a variety of other presentations, including timetables, 'advertisements', diagrams, sketches and charts.

Some candidates do not assess this data properly, which may contain both information required for a task, but also other information that is not specifically required. It is therefore important that candidates practise the problem solving aspect of the assessment, ie, relating the objectives of a task to the data supplied and discerning what data is and is not relevant.

Some candidates have particular difficulties in extracting information from timetables, confusing times of departure and arrival. Scale diagrams are sometimes misinterpreted, often because there is no understanding of the scale used.

Misunderstanding units, particularly relating to linear dimensions (mm, cm, m and km) and time, prevents some candidates from successfully completing their search for information needed to complete a task.

Examples of data presentation

Table

Note that some information may not be required. Candidates are expected to select the information they need.

	Brand	
	MemStic	**StoreSafe**
Memory size (gigabytes)		
1GB	Not in stock	£2.36
2GB	£3.98	£4.12
4GB	£6.48	£7.24
8GB	£11.46	Not in stock

Diagram

In this example, candidates must choose a route and then use the travel times given to work out a total travel time.

Diagram to show travel time in minutes between towns and villages

Dunnamore

20

Moneymore

15

15

20

Pomeroy

10

Cookstown

20

15

15

15

15

Maghery

15

Dungannon
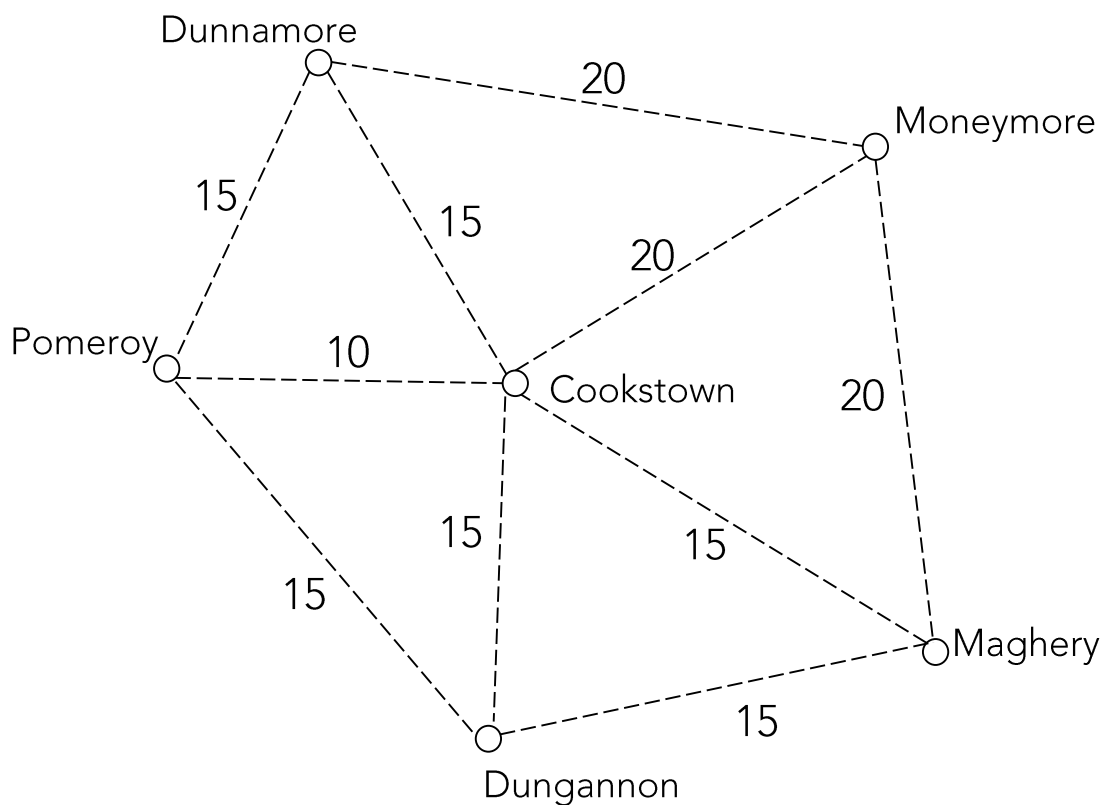
Key   ○   Pick up

Example   ○- - - - - -○ means that it takes **10 minutes** to
                    10   drive between the two pick up
                                points

Train timetable

Candidates are expected to understand departure and arrival times and be able to work out the time taken for a journey, eg leave Bangor and arrive in Portadown by 11:30.

Train times: Bangor – Belfast – Lisburn - Portadown				★			
Bangor	0857	0927	0957	-	1027	1057	1127
Holywood	0917	0947	1017	-	1047	1117	1147
Belfast Central	0929	0959	1029	1035	1059	1129	1159
Great Victoria Street	0940	1010	1040	-	1110	1140	1210
Lisburn	1002	1032	1102	-	1132	1202	1232
Portadown	1028	1058	1128	1108	1158	1228	1258
★Enterprise service between Belfast and Dublin. Different fares apply.							

Advertisement

In this example, candidates must extract the information they need to find the cost of a journey.

Easy-travel airport minibuses

Book your minibus to and from the airport

We charge:
£40 for the first 75 miles of **each** journey
and £1.90 for **each mile** over 75 miles.

Part of a catalogue

Candidates must choose and extract information. In this example, a choice of hutch is made and the price and dimension used to answer the problem set.

Daisy hutches

small
£56.00

large
£63.00

Size 150cm long
60cm wide
60cm high

Size 175cm long
60cm wide
60cm high

Diagram (unscaled)

Candidates must understand how to read off the dimensions and use in calculations eg, area.

house

1.6m

0.8m

2.3m

1.1m   1.8m   1.1m

1.5m

concrete patio

grass

3.5m

Key   window   fence   wall   doors
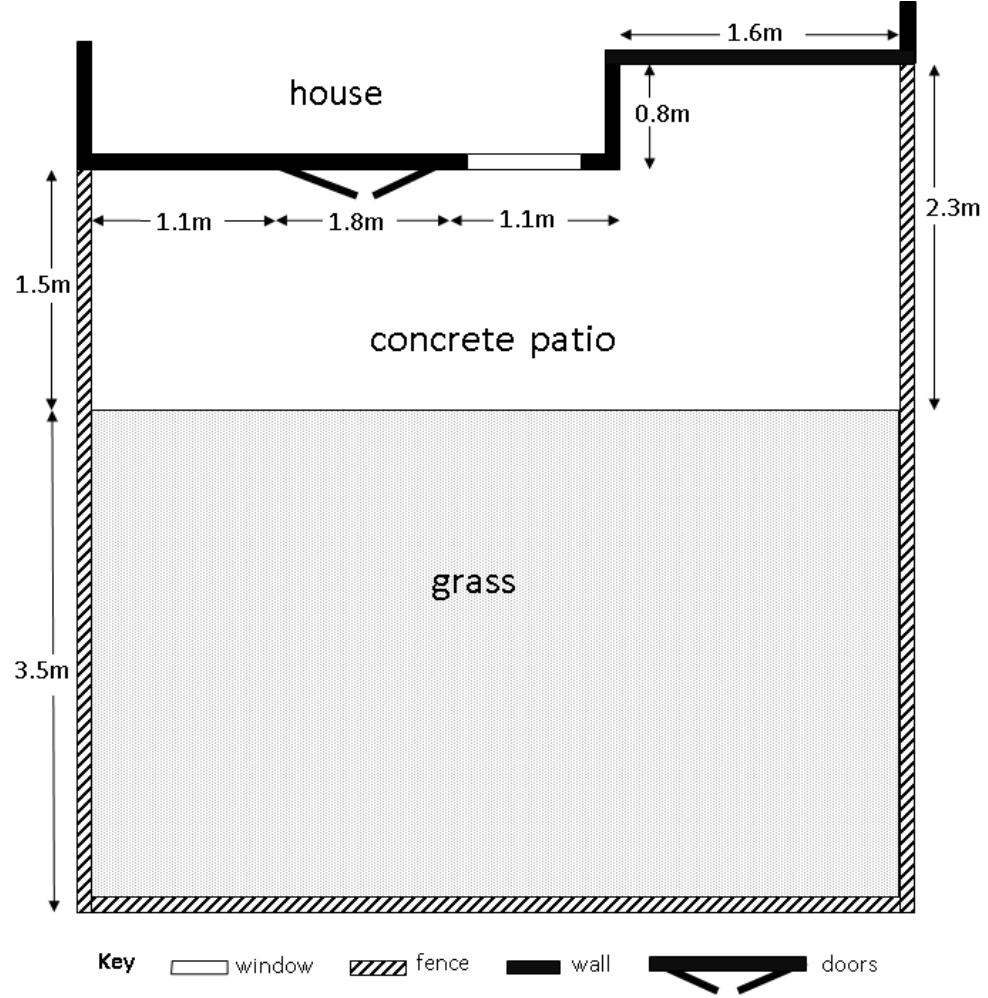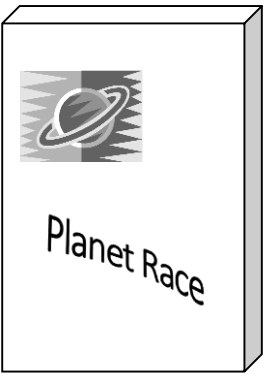
Diagram (unscaled)
The example below is information for drawing a scale diagram. Note the different units.

4.0m

2.4m

0 0

800mm

400mm

Tabulated data for a statistics calculation

In this example, candidates must recognise not only how many testers there are, but that the number of testers varies and therefore, in calculating a mean, the divisor may be different for each game tested.
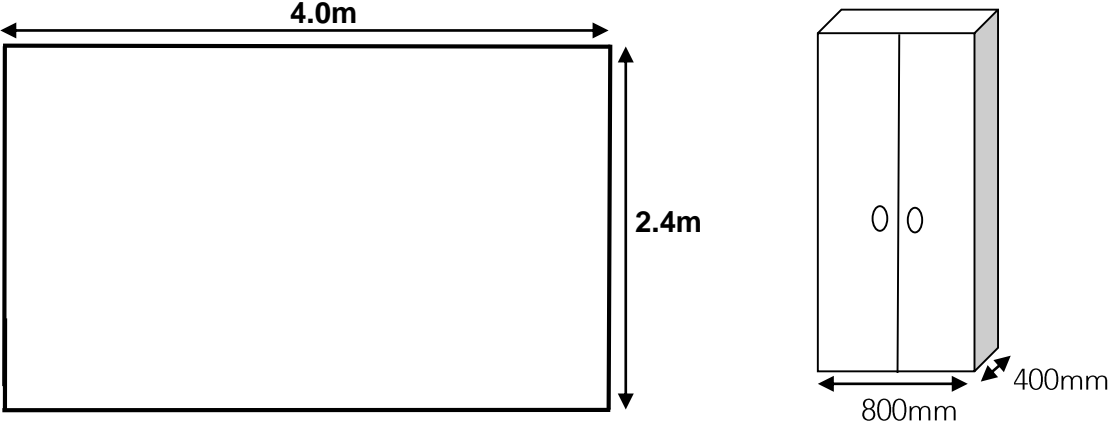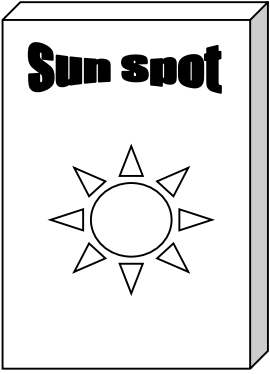
Scores for new games			
Game	**Sun Spot**	**Planet Race**	**Other World**
Price	£17.99	£32.99	£34.99
Tester	**Score**		
Adam	Did not test	10	13
Bill	14	9	Did not test
Claire	Did not test	10	12
Chris	11	18	19
Elena	16	19	16
Ivo	8	12	Did not test
Joe	Did not test	19	11
Karim	Did not test	11	8
Miri	15	16	20
Nia	9	10	Did not test
Pablo	6	10	17
Rocco	14	20	16
Sarah	Did not test	17	Did not test
Tasha	8	12	Did not test
Vladimir	9	17	18

Candidates should be able to extract scores in various forms for statistical calculations.

Film	No Memory	The Long Drive	Best Friends	The Flood
viewers' ratings	★★★★★	★★★★★	★★★★	★★
	★★★	★★★★	★★★	★
	★	★★★★★	★★★★	★
	★★	★★★★	★★★	★
	★	★★	★★★★	★★
	★★	★★★★★	★★★	★★
	★★	★★★★★	★★★	★
	★	★	★★★	★★
	★★★	★★★★	★★★★	
	★★	★★★★★	★★★★	
	★			
	★★			
	★			
	★★			

Key for ratings
★★★★★ = brilliant
★★★★ = good
★★★ = okay
★★ = poor
★ = terrible

3   Essential Skills Application of Number at Level 1
3.3 Calculate (carrying out calculations and checking)

General

Many candidates do not show units either in their answers or workings. Although a candidate will not be repeatedly penalised for this, the absence of units can lead to confusion for the candidate as their answer develops, eg when drawing scale diagrams. Many candidates ignore the need to make use of the £ sign or give answers in incorrect money format, eg an answer £35.10 written as £35.1 will be penalised.

The misreading or misinterpretation of answers from calculators causes problems for a number of candidates. This particularly applies to the position of the decimal point leading in certain cases to clearly inappropriate solutions.

Some candidates have difficulty using simple formulae. They are expected to use simple formulae in words, eg:

All measurements must be in metres

> **Length of liner** you need = **length** of pond + (2 x depth of pond) + 0.6m

> **Width of liner** you need = **width** of pond + (2 x depth of pond) + 0.6m

Specific types of calculation

The following are examples of calculations that are not understood by a number of candidates:

- Percentages **eg** recognition that 20 out of 50 (customers) is 40%
  eg recognition that 30% is the same as 3/10
- Fractions **eg** calculation of one fifth as a price reduction
- Ratio **eg** use of ratio 1 : 5 to make dilution
- Time **eg** recognition that 38.5 hours is 38 hours 30 minutes
- Weight conversions **eg** 1.25kg = 1250g
- Calculation of area **eg** of rectangle 5m x 7m = 35m2
- Scaling down **eg** use of 1cm represents 1m
- Linear conversion **eg** recognition that 10mm = 1cm, 1000m = 1km.

Candidates generally calculate means and ranges accurately. A few confuse range with the mean or another type of average

Checking calculations

As part of a general checking process, candidates should be taught to ask themselves whether or not their answers make sense in the context of the task, eg, the average price of a product cannot be more than the highest price in a list of prices.

Candidates are expected to be able to demonstrate simple checks of calculations or parts of calculations they have used. Checks must not be straightforward repeats of calculations and candidates are expected to use reverse checks, approximation or a different method. Candidates must have shown the original calculation in the relevant part of the task. Some candidates show checks of answers where no working has been shown – such checks are not awarded marks as the check required must specifically relate to a previous calculation shown.

eg original calculation is $105.6 \div 2.75 = 38.4$
acceptable checks: $38.4 \times 2.75 = 105.6$ **or** $105 \div 3 = 35$ (nearly 38.4)

eg original calculation is $96.7 \div 2 = 48.35$
acceptable checks: $48.35 \times 2 = 96.7$ **or** $96.7 \times 0.5 = 48.35$

eg original calculation is $74 \times 3 = 222$
acceptable checks: $222 \div 3 = 74$ **or** $74 + 74 + 74 = 222$

Explaining scales

Some Task 2 checking relates to the scaled lengths drawn or the interpretation of a scale plan. Candidates should be able to relate the scale used to a scaled length on a diagram. Some candidates lose marks by missing either reference to the scale or reference to the scaled length.

eg 'the scale is 2 squares = 1 metre, so 3 metres is 6 squares'

eg '1cm represents 50cm and 6cm is 300cm = 3m'

3   Essential Skills Application of Number at Level 1
3.4   Interpret (presentation and explanation of results)

Explanations

Candidates should be encouraged to put their conclusions into the context of the task brief. This makes the exercise much more meaningful and encourages candidates to appreciate the relevance of what they have calculated. Many candidates have difficulty in expressing what they have found out from the results of their calculations. Generally, what is required is a simple interpretation and reiteration of values calculated.

eg 'Option A, it's cheaper by £10'

When interpreting statistical calculations there is often a requirement to comment on a measure of location (average) and one on a measure of dispersion (range). Most candidates use the range as the measure of dispersion but fail to conclude that a small range is normally preferable to a large range in that it shows a greater degree of consistency in the data. Candidates should understand that range is indicative of the consistency or variation of the original data.

eg 'The average waiting times at the doctor's in Ardrum (10 minutes) are less than in Rednagh (21 minutes). The range for Ardrum (7 minutes) shows that waiting times are more consistent than for Rednagh (range = 17 minutes).

Graphical support

Candidates must be able to summarise their results and support their explanations using a variety of techniques.

Task 1 (Number)

Candidates are expected to summarise results in a coherent way. Results of calculations are frequently required in a table format. At Level 1, the results (and therefore headings) required are usually explicitly stated in the step instructions. A few candidates lose all marks for steps requiring a table by drawing charts or graphs. Candidates should be encouraged to plan tables to summarise results in a logical format.

Tables

Candidates must arrange results in headed rows and columns, draw lines to show the rows and columns and accurately record results.

When tables are constructed, marks are lost by some candidates who:
- fail to delineate rows and columns
- do not head rows and columns with suitable labels
- do not accurately enter the results / data required.

Simple timetables, time lines or flow charts may also be required.

Example of table showing newspaper sales

| Newspaper sales figures		
Date	Number of copies sold in a week	Copies sold in March
4 March	11000	
11 March	9800	42 000
18 March	9200	
25 March	12000	

Task 2 (shape, space and measures)

Candidates must be able to construct diagrams and plans to a given scale expressed as a number of graph paper squares, eg 'one large square represents 1 metre', shown on the graph paper. Scale drawings should not be done freehand.

When diagrams and plans are drawn, marks are lost by some candidates who
- do not understand scaling
- do not write the scale on their diagram
- forget to label the diagram.

Example of scale diagram
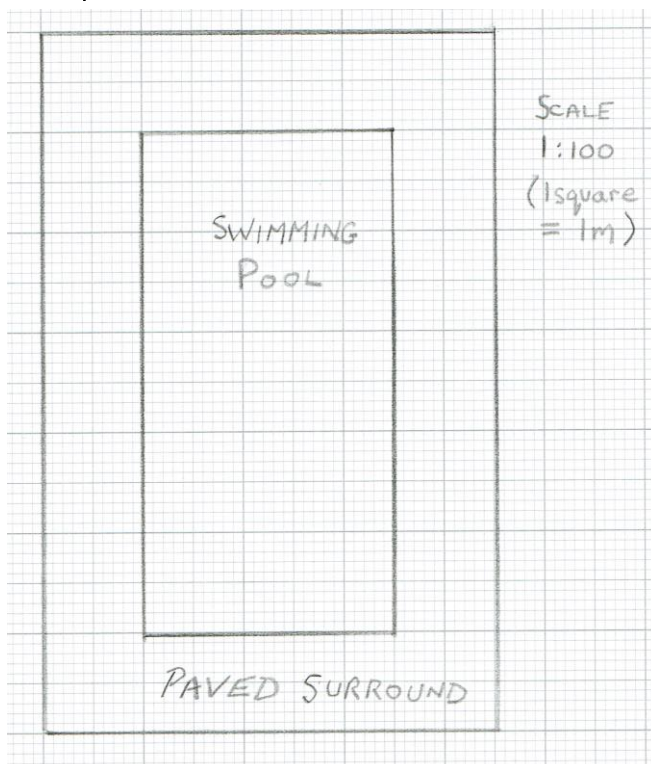
This example is a scale diagram showing a swimming pool 10m x 5m with a 2m paved surround (2mm graph paper used).

Candidates must draw to scale using a ruler, label the diagram and label the scale
(1 square = 1m is accepted).

Task 3 (statistics)

Candidates are expected to support their results with suitable charts or graphs. Some candidates lose all marks for this question because they do not produce the required graphic, eg produce a line graph or table when instructed to draw a chart. They should understand that a line graph is only an option if the data plotted is continuous data. It is not an option if the results illustrated are discrete. Pie charts are suitable only if there is an intention to show proportions. A table is not a chart.
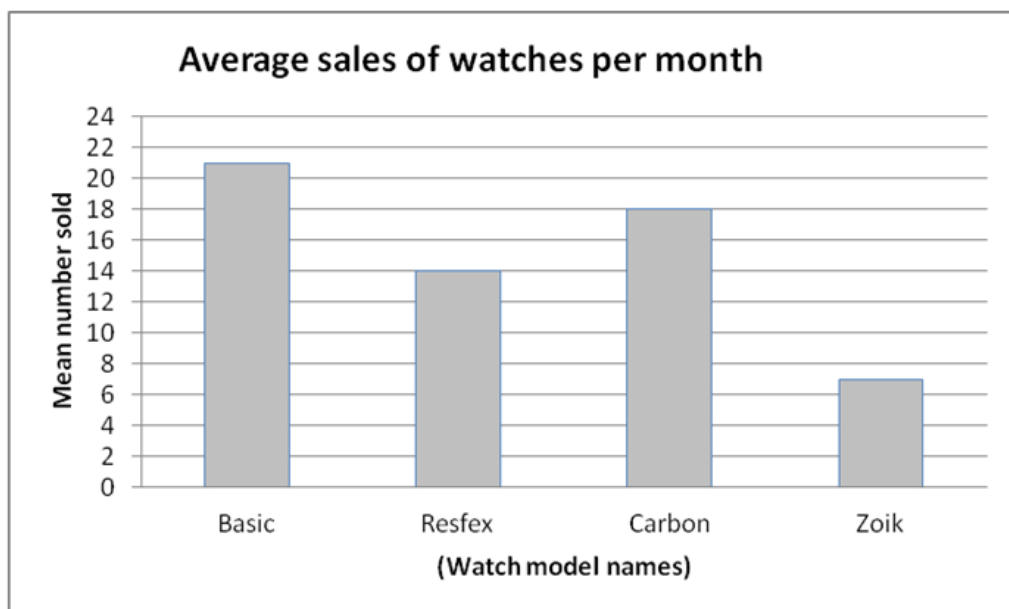
Bar charts

When bar charts are drawn, marks are lost by some candidates who:
- fail to label axes, particularly the vertical axis
- do not construct a continuous linear scale on the vertical axis
- fail to start the vertical scale at zero
- do not draw bar heights accurately.

Example of bar chart showing watch sales

A chart should have a title, axes labelled, bars labelled (a key is also acceptable), a scale starting at zero and bar heights accurately plotted.


Average sales of watches per month

Pie charts

A pie chart should have a title, segments labelled or a key provided, and sector angles accurately drawn. It must only be used where the intention is to show proportion. A circular template will normally be provided and candidates will require a protractor to measure angles in paper-based assessments.

When pie charts are drawn, marks are lost by some candidates who:
- cannot relate proportion / percentage to 360°
- do not draw sector angles accurately.

Example of pie chart showing proportion of different watches sold
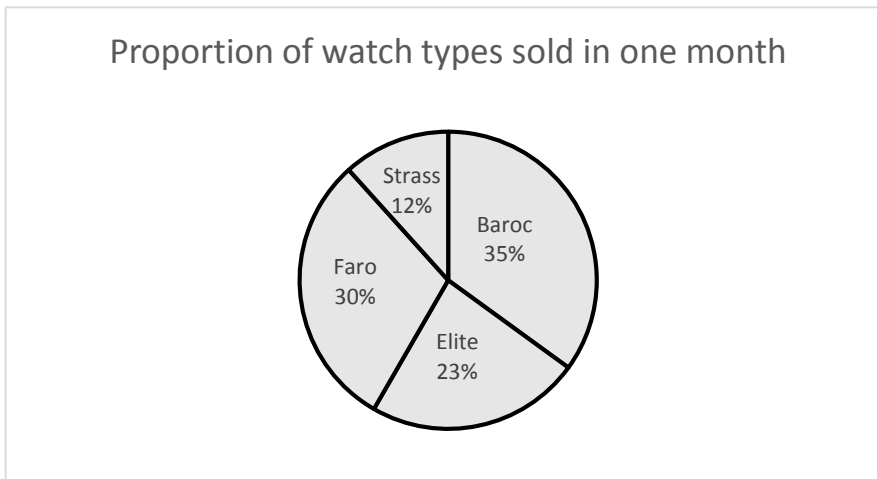
Proportion of watch types sold in one month

Line graphs

A line graph should have a title, labelled axes, continuous linear scales on both vertical and horizontal axes, the vertical scale may start at zero (if it does not, a broken line symbol should be used), accurate plots shown clearly and a single line joining the plots.

When line graphs are drawn, marks are lost by some candidates who:
- fail to label axes, particularly the vertical axis
- do not construct a continuous linear scale on the vertical axis
- do not plot accurately.

Example of line graph showing total sales per month over a continuous period (one year)

Watch sales for one year

4   Essential Skills Application of Number at Level 2
4.1 Structure of assessment

The assessment comprises **two** holistic tasks, each covering one or more of the following technical content areas:

- number
- shape, space and measure
- handling data and statistics.

Each task also addresses all three process skills: **represent**, **calculate** and **interpret** (see Section 2).

The tasks may be attempted in either order, although candidates should plan to spend a roughly equal amount of time on each one. Candidates should be encouraged to read through each task carefully, ensuring they have understood the scenario and each of the things they are expected to do.

4   Essential Skills Application of Number at Level 2
4.2   Represent (finding information, methodology)

Finding information

Information will be found in the introduction to a task, the text in the question itself, in table format and in a variety of other presentations, including timetables, 'advertisements', diagrams, sketches and charts.

Some candidates do not assess this data properly, which may contain both information required for a task, but also other information that is not specifically required. It is therefore important that candidates practise the problem solving aspect of the assessment, ie, relating the objectives of a task to the data supplied and discerning what data is and is not relevant.

Some candidates have particular difficulties in extracting information from timetables, confusing times of departure and arrival. Scale diagrams are sometimes misinterpreted, often because there is no understanding of the scale used.

Misunderstanding units; particularly relating to linear dimensions (mm, cm, m and km) and time, prevents some candidates from successfully completing their search for information needed to complete a task.

Examples of data presentation
Table

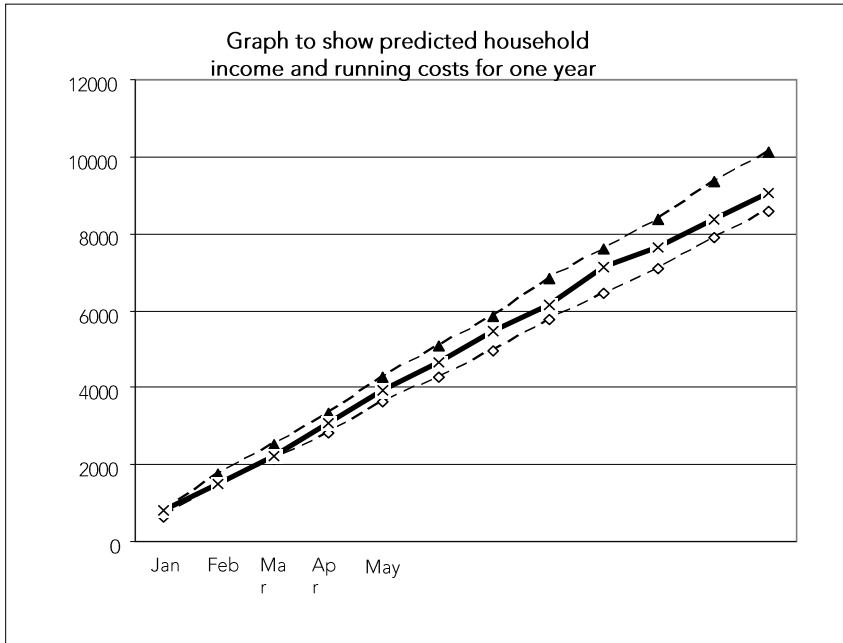| Total hours of sunshine in June		
	Sunshine (hours)	
Year	Site A	Site B
1991	135.0	153.8
1992	213.7	192.7
1993	224.2	193.6
1994	265.0	198.8
1995	187.7	182.9
1996	282.7	244.5
1997	151.6	136.5
1998	158.4	141.7
1999	239.1	188.5
2000	169.5	151.9
2001	248.0	160.0
2002	191.5	197.3
2003	245.5	215.1
2004	236.0	194.5
2005	219.3	194.9
2006	263.3	171.7
2007	170.7	154.5
2008	226.9	198.1
2009	192.8	184.9
2010	219.1	220.1
Total	**4240.0**	**3676.0**

Note that some information may not be required. Candidates are expected to select the information they need. In this example, candidates need to select relevant data for average and range.

Bar chart

Total rainfall for June 1991 - 2010
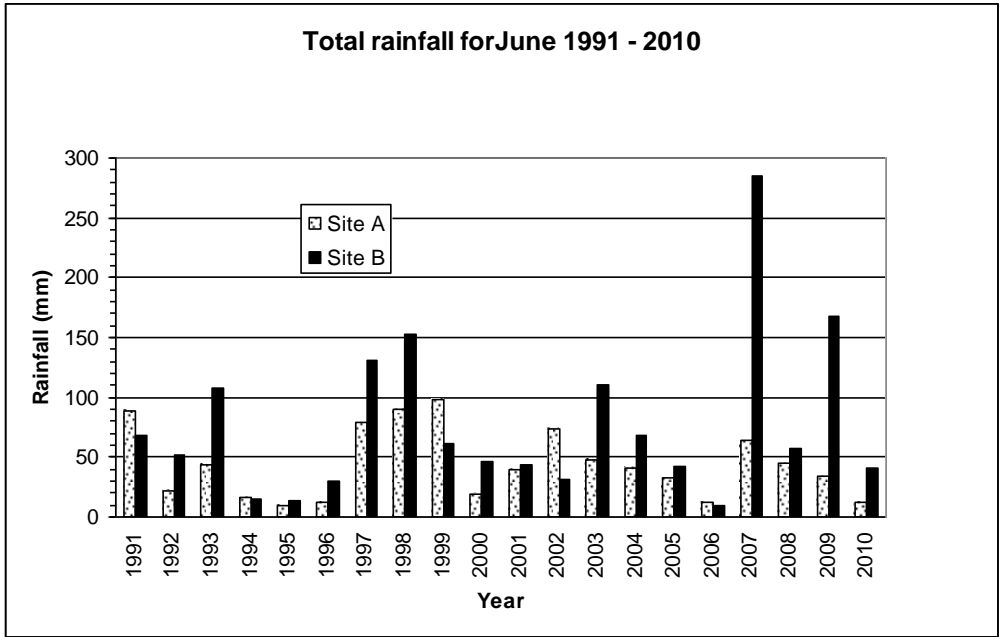
In this example, candidates are expected to compare rainfall for the two sites.

Multi-line graph

Graph to show predicted household income and running costs for one year

In this example, candidates should recognise that a £55 contribution is insufficient to cover money spent whereas a £65 contribution will cover expenditure.

Map
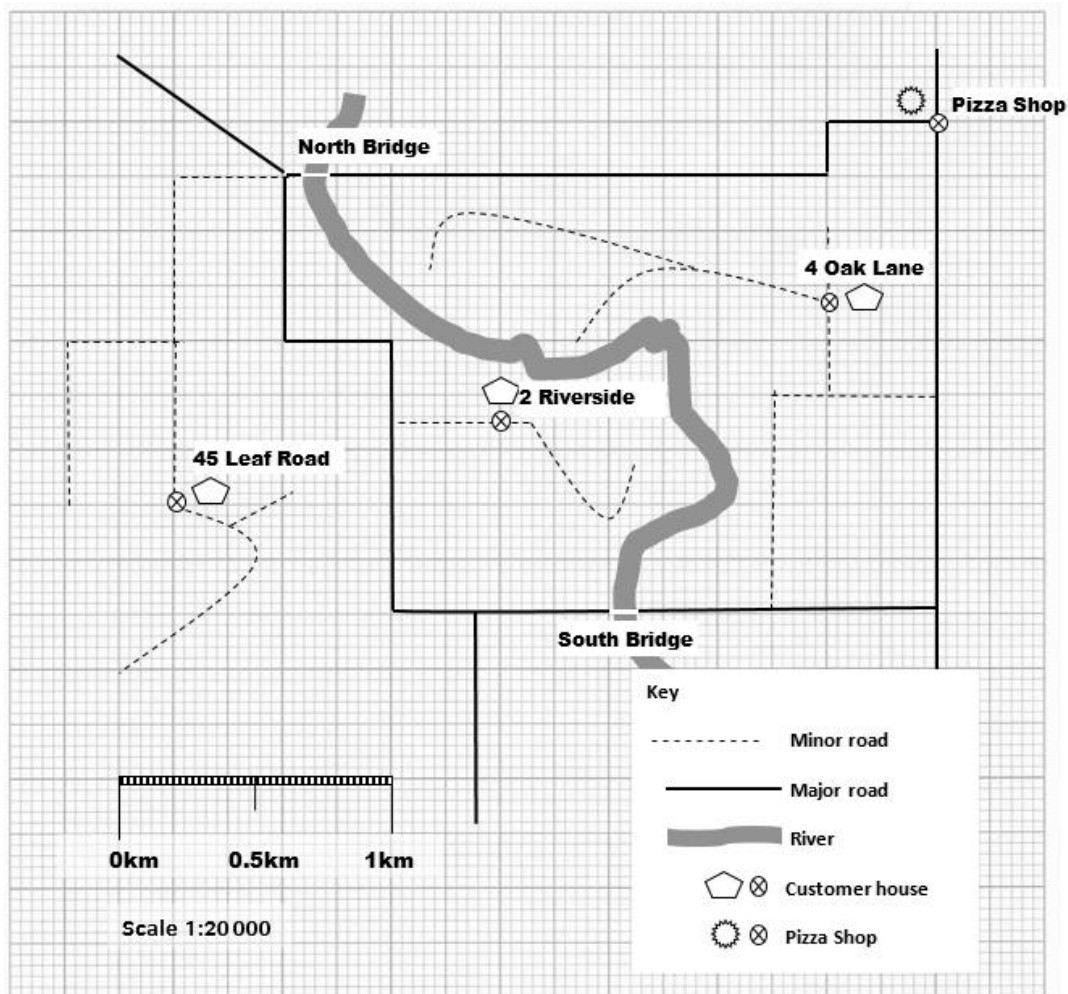
In this example, candidates might be required to work out distances from the scale given.

Candidates need a ruler to measure distances on maps and scale diagrams.

Allowance is made in mark schemes for sensible approximations where lines are not straight. Allowance is also made for the slightly different start and end points of any measurements made. Candidates must use the scale given to calculate actual distances.
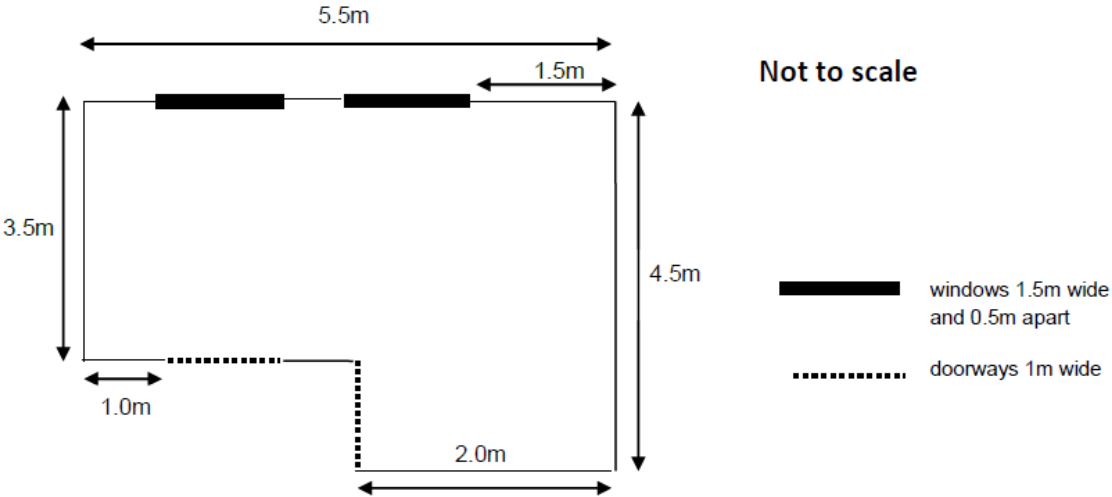
Diagram (scaled)
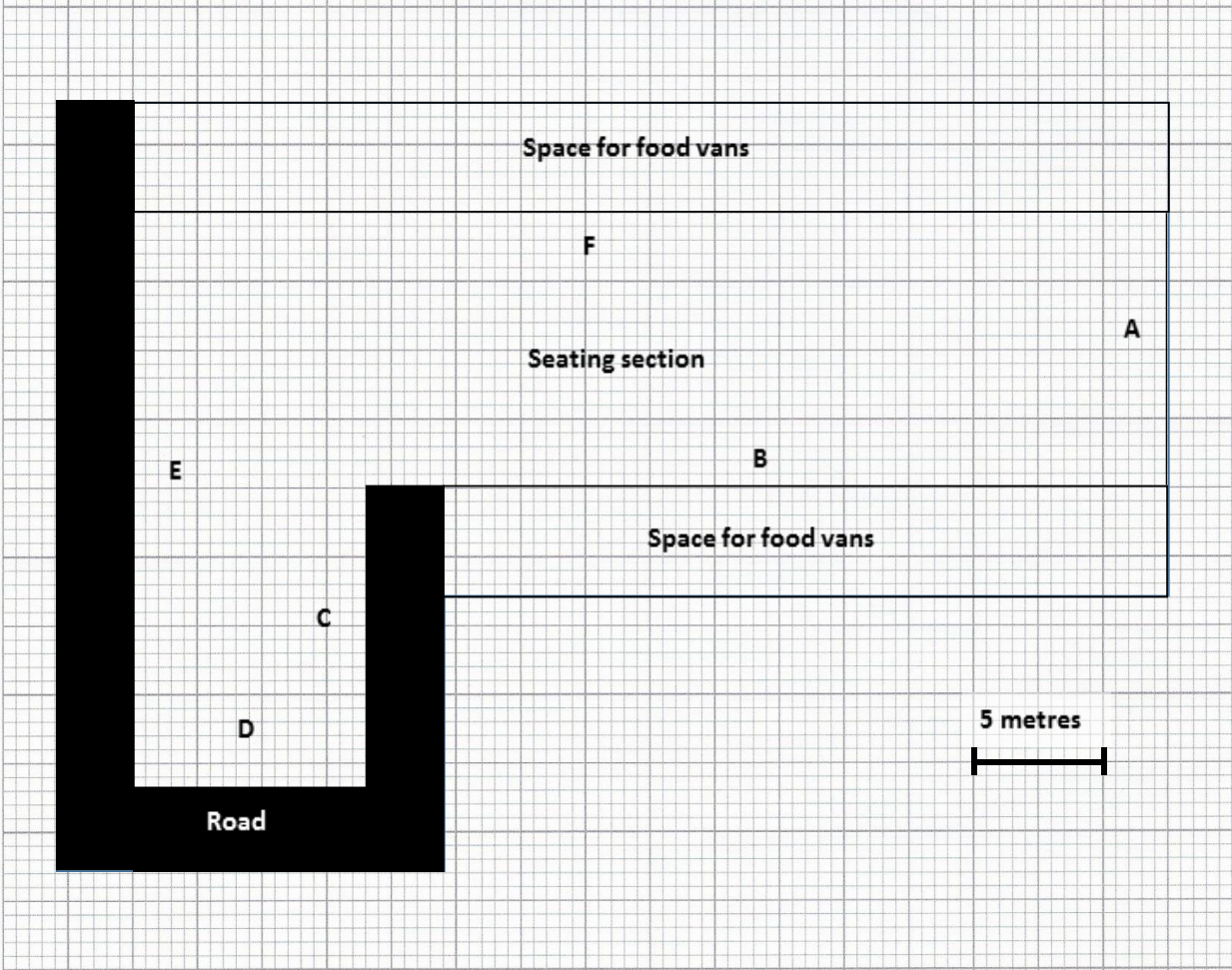
In this example, candidates might be required to calculate dimensions from the given scale.

Diagram (unscaled)

In this example, candidates might be required to calculate area from the dimensions given.

Bus/train timetable

212/X212 Derry~Londonderry – Belfast

	X212	212	212	212		212	212		212	212
Derry/Londonderry, Buscentre	1000	-	1030	1100	Then at these minutes past each hour	00	30	Until	1630	1700
Altnagelvin Hospital	1005	-	1035	1105		05	35		1635	1705
Drumahoe	1010	-	1040	1110		10	40		1640	1710
Claudy, Crossroads	1018	-	1048	1118		18	48		1648	1718
Dungiven,	1035	1035	1105	1135		35	05		1705	1735
Maghera Flyover	-	1050	1120	1150		50	20		1720	1750
Castledawson	-	1100	1130	1200		00	30		1730	1800
Toomebridge	-	1110	1140	1210		10	40		1740	1810
Belfast, North Street	1137	1145	1215	1245		45	15		1815	1845
Belfast, Europa Buscentre	1145	1150	1220	1250		50	20		1820	1850

212/X212 Belfast – Derry~Londonderry

	212		212	212		212	212	X212	212	212
Belfast, Europa Buscentre	1100	Then at these minutes past each hour	00	30	Until	1630	1700	1715	1730	1800
Toomebridge	1135		35	05		1705	1735	-	1805	1835
Castledawson	1145		45	15		1715	1745	-	1815	1845
Maghera Flyover,	1155		55	25		1725	1755	-	1825	1855
Dungiven	1210		10	40		1740	1810	1820	1840	1910
Claudy, Crossroads	1220		20	50		1750	1820	1830	1850	1920
Drumahoe	1230		30	00		1800	1830	1840	1900	1930
Altnagelvin Hospital	1235		35	05		1805	1835	1845	1905	1935
Derry/Londonderry, Buscentre	1250		50	20		1820	1850	1900	1920	1950

In this example, candidates might be required to plan a journey based on a specific set criteria (eg if joining from an intermediate destination).

Some candidates have difficulty understanding
- the relevance or not of interim stops
- return journeys
- time taken.

Scatter graph and trend line (line of best fit)

Temperature and number of cold drinks sold
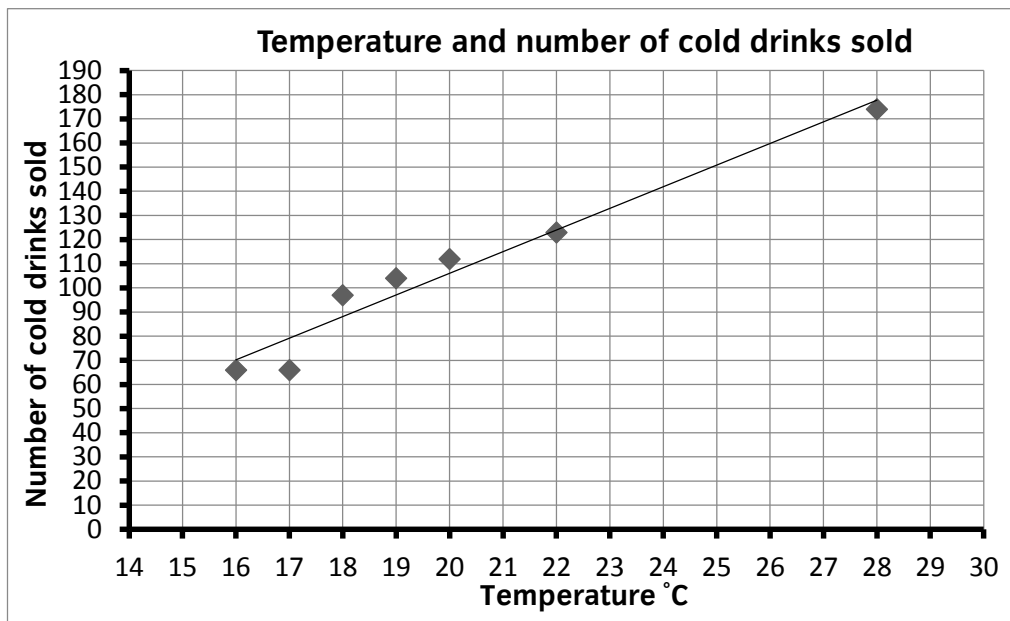
Candidates should be able to extract information from the graph and understand that the trend line (line of best fit) shows that the number of cold drinks sold tends to be greater when the temperature is higher.

4   Essential Skills Application of Number at Level 2

4.3 Calculate (carrying out calculations and checking)

General

Many candidates do not show units either in their answers or workings. Although a candidate will not be repeatedly penalised for this, the absence of units can lead to confusion for the candidate as their answer develops. Many candidates ignore the need to make use of the £ sign and some give answers in incorrect money format, eg an answer £35.10 written as £35.1 will be penalised.

The misreading or misinterpretation of answers from calculators causes problems for a number of candidates. This particularly applies to the position of the decimal point leading in certain cases to clearly inappropriate solutions.

Understanding the sensible use of rounding is problematic for some candidates. As a general rule, candidates should not round values when doing calculations leading to a final answer, ie premature rounding may lead to an inaccurate final answer.

Formulae

Some candidates have difficulty using formulae. They are expected to use simple algebraic formulae, eg:

$$S = \frac{100A}{E}$$

where S = percentage saving

A = amount saved in pounds

E = estimated annual cost for electricity
from present supplier in pounds

Specific types of calculation

The following are examples of calculations that are not understood by a number of candidates:

- percentages

  eg recognition that 15 out of 50 (customers) is 30%

  eg recognition that 30% is the same as 3/10

- fractions

  eg calculation of one third as a price reduction, NB one third is not 33% for purposes of calculation

- ratio

  eg use of ratio 1 : 5 to make a dilution, NB 1 : 5 is **not** $\frac{1}{5}$

- time, particularly addition of time

  eg recognition that 38.5 hours is 38 hours 30 minutes

  eg 2hrs 49mins + 1hour 52mins = 4hours 41mins not 4hours 01mins

  eg 52:30 ÷ 3 = 17:30 not 17:43

- weight conversions

  eg 1.25kg = 1250g

- conversions from imperial measure to metric (conversion factors usually given)

  eg 8 feet = 2.4384m, given 1foot = 0.3048m

- currency conversions given conversion factor

  eg $640 = £402.52 given $1 =£ 1.59

  Note all decimal places should be used in the initial calculation

- calculation of areas

  eg of L-shaped floor areas

- calculation of volume

- metric conversion

  eg mm to cm

  eg cm (to m) to km ie recognition that 10mm = 1cm , 1000m = 1km

  eg g to kg

- scaling up

  eg use of 1cm represents 5km or scale 1: 500 000, map measurement is 4.5cm, so actual distance is 22.5km (4.5 x 500 000 = 2 250 000cm = 22.5km)

- scaling down

  eg use of 2cm to represent 5m or scale 1 : 250

- candidates generally calculate means and range accurately. A few confuse range with the mean or another type of average. Level 2 candidates must also understand how to calculate median and mode.

- many candidates show little understanding of the basic principles of probability. They need to be taught definitions, scales (0 to 1) or (0% to 100%), simple rules and the correct form for expressing probability, ie, fractions, decimals or percentages but not ratio

  eg there is a 60% chance that the average temperature in June will be greater than the July average

  eg the chance of picking the number 1 from a box containing numbers 1- 100 is 0.01

  eg the probability of the machine breaking down is $\frac{1}{500}$

Checking calculations

As part of a general checking process, candidates should be taught to ask themselves whether or not their answers make sense in the context of the task, eg the average price of a product cannot be more than the highest price in a list of prices.

Candidates are expected to be able to demonstrate simple checks of calculations or parts of calculations they have used. Checks must not be straightforward repeats of calculations and candidates are expected to use reverse checks, approximation or a different method. Candidates must have shown the original calculation in the relevant part of the task. Some candidates show checks of answers where no working has been shown – such checks are not awarded marks as the check required must specifically relate to a previous calculation shown. A number of candidates show reverse calculations that simply are original calculations written in reverse form taking no account of where rounding has occurred in their answer.

eg original calculation is $105.6 \div 2.75 = 38.4$ rounded to 38
acceptable checks: $38.4 \times 2.75 = 105.6$ (exact reverse calculation) or $38 \times 2.75 = 104.5$ with explanation that value is not exact because of rounding (ie value is of right order) or 105 3 = 35 (nearly 38.4)
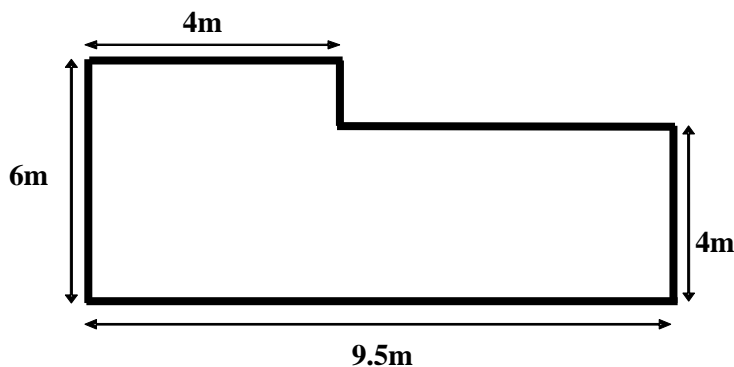not acceptable: $38 \times 2.75 = 105.6$ (incorrect calculation)

eg original calculation is $96.7 \div 2 = 48.35$
acceptable checks: $48.35 \times 2 = 96.7$ or $96.7 \times 0.5 = 48.35$

eg original calculation is £17.56 x 3 = £52.68
acceptable check: £17.56 + £17.56 + £17.56 = £52.68

eg showing a different method (eg different area breakdowns for L-shaped area),

original calculation area = $(4 \times 6) + (5.5 \times 4) = 46m^2$
acceptable check: area = $(9.5 \times 6) - (2 \times 5.5) = 46m^2$
or area = $(4 \times 2) + (9.5 \times 4) = 46m^2$

Explaining scales

Candidates may be asked to relate the scale used to a scaled length on a diagram. Some candidates lose marks by missing either reference to the scale or reference to the scaled length.

eg the scale is 1 : 100, so 6m (= 600cm) is 600 ÷ 100 = 6cm on the plan

eg the scale is 1 : 20 000, so 5cm on the map is 5 x 20 000 = 100 000cm = 1km

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

4 Essential Skills Application of Number at Level 2

4.4 Interpret (presentation and explanation of results)

Explanations

Candidates should be encouraged to put their conclusions into the context of the task brief. This makes the exercise more meaningful and encourages candidates to appreciate the relevance of what they have calculated. Simple statements that reiterate what a candidate's results show are required.

eg The floor area of Office A is not big enough

eg I chose items A, B, and C because they cost less than £85 (my budget)

If a comparison is asked for, candidates must use a statement that compares results.

eg Option A, it's cheaper (than Option B)

eg Markethill is 6 miles further than Bessbrook

When interpreting statistical calculations there is often a requirement to make comments on a measure of location (average) and one on a measure of dispersion (range). Most candidates correctly calculate the range as the measure of dispersion but fail to conclude that a small range is normally preferable to a large range in that it shows a greater degree of consistency in the data. Many candidates have difficulty in expressing what they have found out from the results of their calculations, particularly the interpretation of range, where a reference to variation or consistency is expected. Suitable explanations will include references to both range and average.

eg Boys do more exercise than girls, mean 55 minutes per day compared to 43.5 minutes, but exercise for boys is more varied as the range for boys is higher than range for girls.

Graphical support

Candidates must be able to summarise their results and support their explanations using a variety of presentation techniques.

Number

Candidates are expected to summarise results in a coherent way. Results of calculations are frequently required in table format. At Level 2, candidates are expected to extract the required results (and therefore headings) from the text of the question instructions. A few candidates lose all marks for questions requiring a table by drawing charts or graphs. Candidates should be encouraged to plan tables to summarise results in a logical format. Data entered in tables must be consistent with results previously calculated.

Candidates must arrange results in headed rows and columns, draw lines to show the rows and columns and accurately record results.

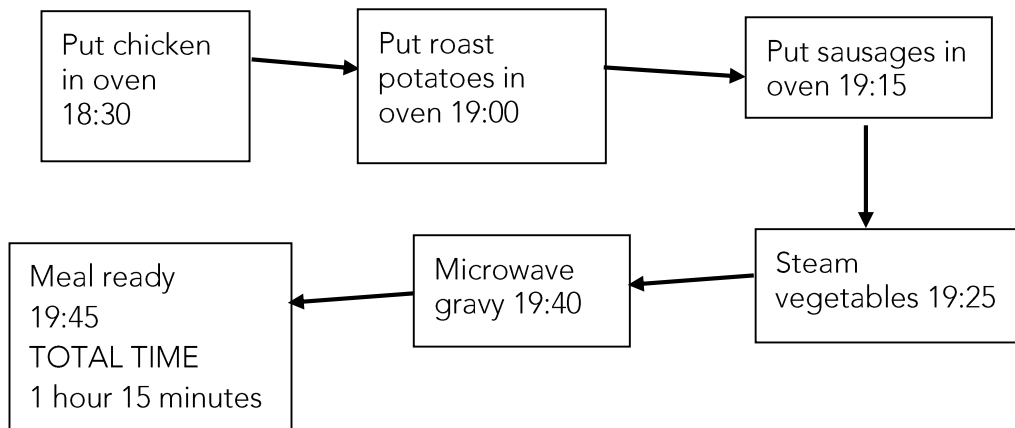When tables are constructed, marks are lost by some candidates who:
- fail to delineate rows and columns
- do not head rows and columns with suitable labels
- do not accurately enter the results / data required.

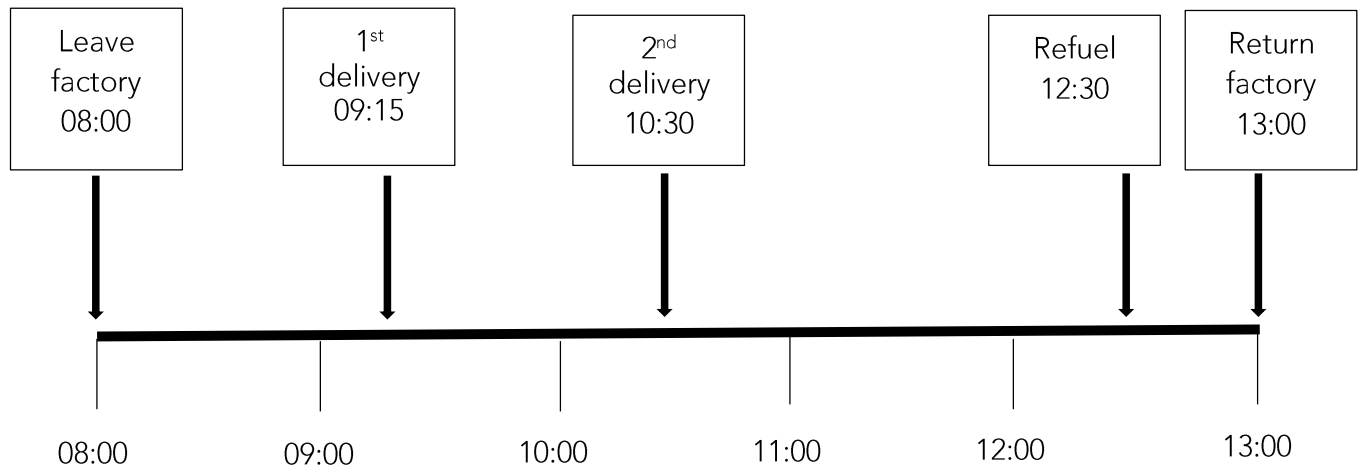Example of table showing results from sales at an event

Items	Money spent (£)	Money from sales (£)	Profit (£)
Materials	57.83		
Hire of hall	25.00		
Toys		98.50	
Cakes		25.40	
Totals	82.83	123.90	41.07

Simple timetables, time lines or flow charts may also be required.

Example of simple flow charts showing a plan to cook a chicken dinner

Put chicken in oven 18:30 → Put roast potatoes in oven 19:00 → Put sausages in oven 19:15

↓

Steam vegetables 19:25 ← Microwave gravy 19:40 ←

Meal ready 19:45 TOTAL TIME 1 hour 15 minutes ←

Examples of simple time lines showing deliveries by lorry

| Leave factory 08:00 | 1st delivery 09:15 | 2nd delivery 10:30 | | Refuel 12:30 | Return factory 13:00 |

08:00   09:00   10:00   11:00   12:00   13:00

Simple summaries of results are needed – so long as candidates provide accurate, complete summaries that are coherent and clearly presented, they will achieve marks.

Shape, space and measures

Candidates must be able to construct diagrams and plans using scales expressed as a ratio, eg a plan scale of 1 : 250. Many candidates lose a mark for not labelling their scale (even scales expressed as a number of graph paper squares representing a particular distance / length will be accepted). Scale drawings should not be done freehand.

eg Scale plan of temporary exhibition area with tent 8m x 6m, 2m fence panels and a car parking area (2mm graph paper used).
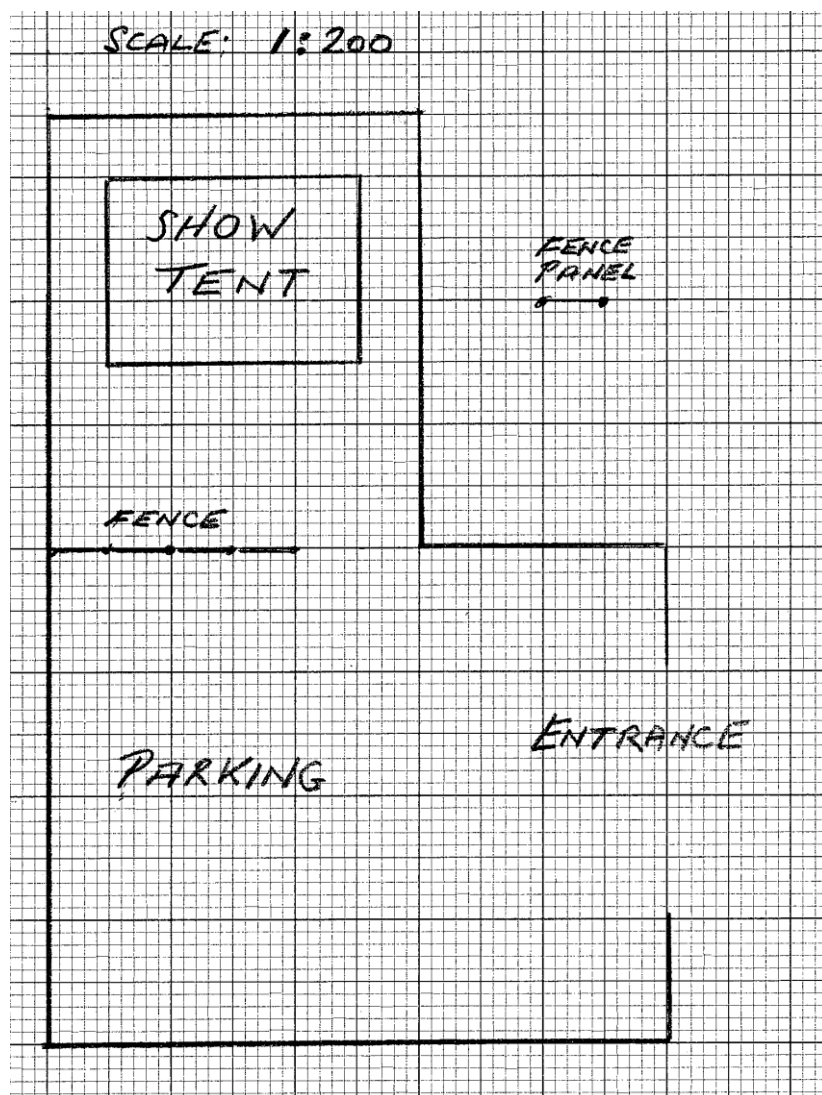
Candidates must draw to scale using a ruler, label the diagram and label the scale (1 square = 1m is accepted; 1:100 is better). Labels must indicate features rather than just measurements.

When diagrams and plans are drawn, marks are lost by some candidates who:
- do not understand scaling
- do not write the scale on their diagram
- forget to label the diagram.

Statistics

Candidates are expected to support their results with suitable charts or graphs, including scatter graphs. They must be able to draw a line of best fit (by eye) on a scatter graph to show relationships between variables or add a point to an existing scatter graph from a calculated result. They should be able to show probability using a simple scaled line.

Some candidates lose all marks for this question because they do not produce the required graphic, eg produce a line graph or table when instructed to draw a chart. They should understand that a line graph is only an option if the data plotted is continuous data. It is not an option if the results illustrated are discrete. Pie charts are suitable only if there is an intention to show proportions. A table is not a chart.

Bar charts

A bar chart should have a title, axes labelled, bars labelled (a key is also acceptable), a scale starting at zero and bar heights accurately plotted.

When bar charts are drawn, marks are lost by some candidates who:
- fail to label axes, particularly the vertical axis
- do not construct a continuous linear scale on the vertical axis
- fail to start the vertical scale at zero
- do not draw bar heights accurately.

Examples of bar charts showing watch sales
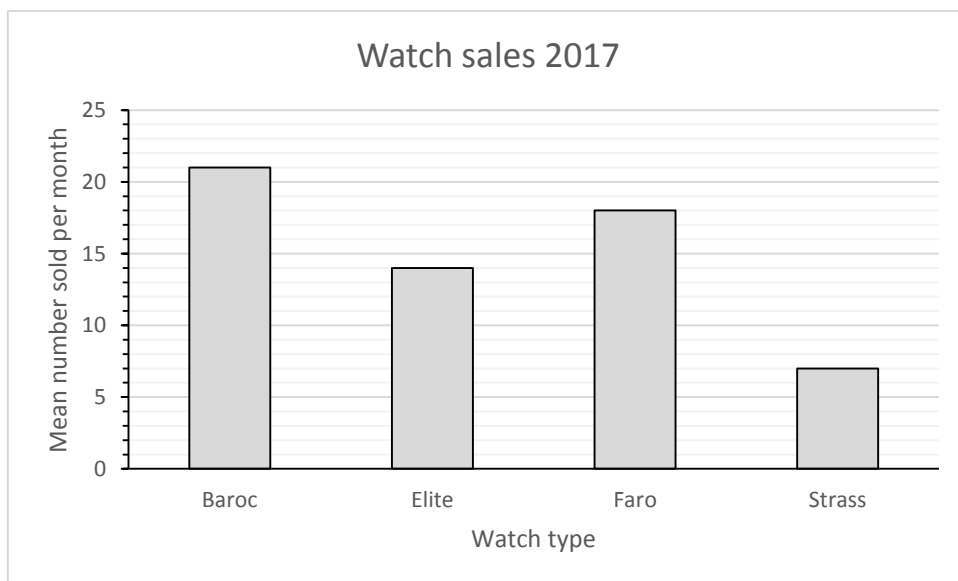
Pie charts

A pie chart should have a title, segments labelled or a key provided, and sector angles accurately drawn. It must only be used where the intention is to show proportion. A circular template will normally be provided and candidates will require a protractor to measure angles in paper-based assessments.

When pie charts are drawn, marks are lost by some candidates who:
- cannot relate proportion / percentage to 360°
- do not draw sector angles accurately.

Examples of pie charts showing proportion of different watches sold
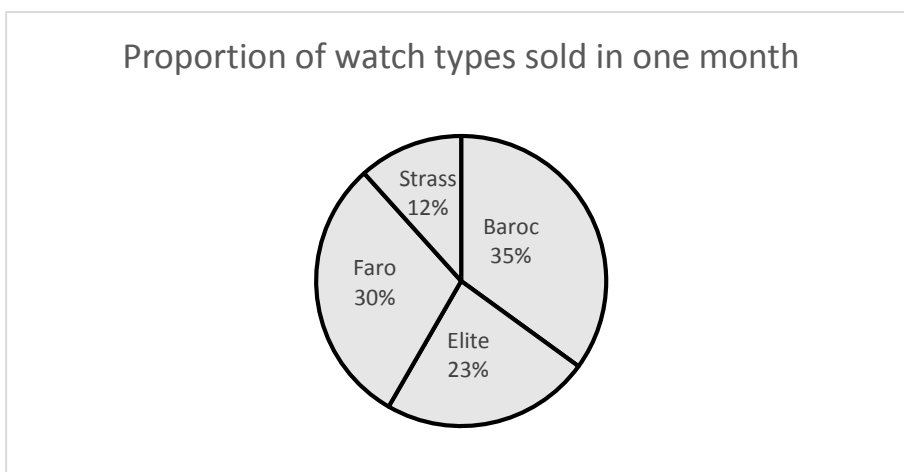
Proportion of watch types sold in one month

Line graphs

A line graph should have a title, labelled axes, continuous linear scales on both vertical and horizontal axes, the vertical scale may start at zero (if it does not, a broken line symbol should be used), accurate plots shown clearly and a single line joining the plots.

When line graphs are drawn, marks are lost by some candidates who:
- fail to label axes, particularly the vertical axis
- do not construct a continuous linear scale on the vertical axis
- do not plot accurately.

Examples of line graphs showing total sales per month over a continuous period (one year)


Watch sales for one year

Probability scales

Probability can be shown on a simple scale line starting at zero (no chance), ending at 1 or 100% (certain), labelled with the calculated probability drawn to scale. Even if a candidate incorrectly calculates a probability value, they may achieve some marks for showing the (incorrect) value on a probability scale.

When probability scales are drawn, marks are lost by some candidates who:
- fail to label the extremes of the scale (using the % sign if labelling 0 – 100)
- do not construct a continuous linear scale
- do not recognise the difference between single and double digit percentages (eg, mark 5% as 0.5 on the scale).

Examples of probability scales showing a 1 in 5 chance (probability 20% or 0.20)

0   50%   100%
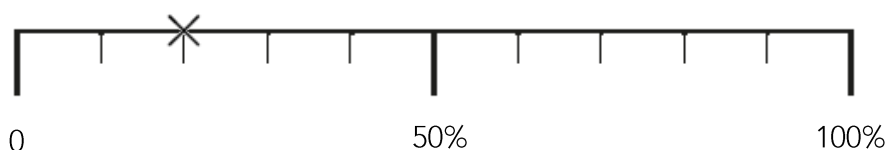
Probability trees

Candidates may be asked to show probability for multiple events and conditional probabilities, using probability trees. Candidates should be taught how to construct and interpret tree diagrams. Marks have been lost by candidates who fail to label their tree diagram accurately before using its values to calculate probability.

Examples of two tree diagrams showing probabilities of winning cinema tickets and for other prizes, versus winning no prize.
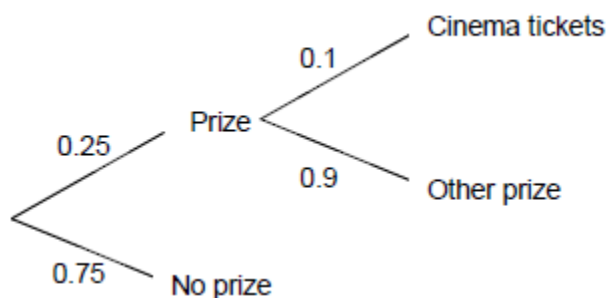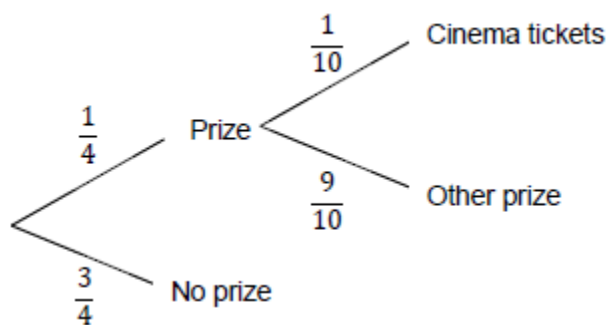
Trends lines (line of best fit)

Candidates must be able to draw a trend line (line of best fit) through given plots. They are expected to draw a straight line 'by eye', which goes through the plots with approximately equal numbers of plots on either side of the line. Candidates may be required to add a plot from calculated results and to extrapolate (extend) the trend line to predict further values.

When trend lines (lines of best fit) are drawn, marks are lost by some candidates who:
- join each plot to the next plot
- draw lines through the origin of their graph
- do not draw the line cross the whole range of points.

Examples of trend lines (line of best fit)
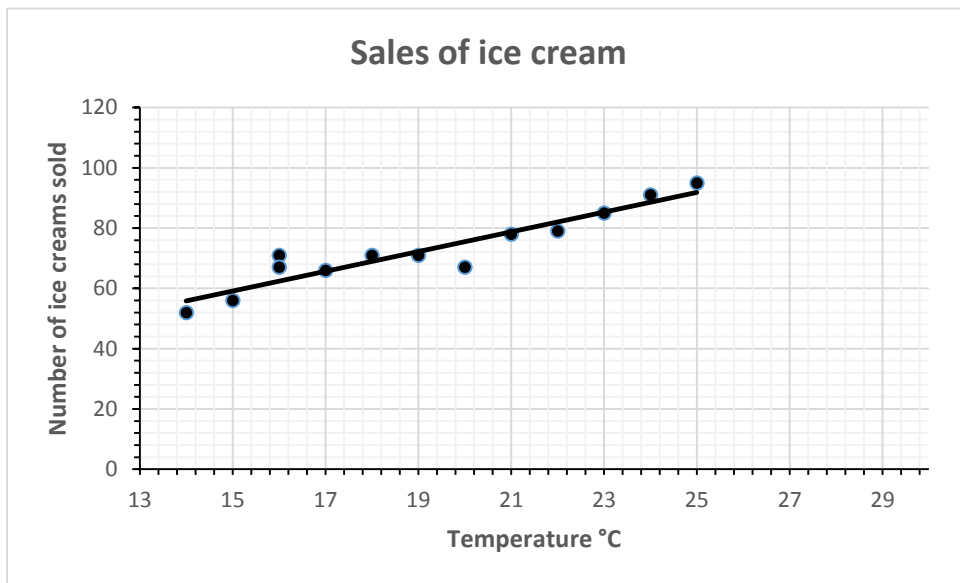
5   Resources available on the Essential Skills (4800) qualification webpage

In addition to this Guidance for Delivery, the following documents are available to download from the **Essential Skills qualification documents webpage**:

- Essential Skills qualifications handbook
  (containing qualification specifications, derived from the CCEA Regulation Qualification and Subject Criteria for Essential Skills)
- Sample assessment papers
- Chief Examiner reports
- Department for the Economy (DfE) Essential Skills Standards and Curriculum.

If you have a complaint, or any suggestions for improvement about any of the services that we provide, email: feedbackandcomplaints@cityandguilds.com