Cambridge Assessment International Education

Specimen Paper Answers

Paper 1

Cambridge IGCSE® / Cambridge IGCSE® (9–1) Mathematics 0580 / 0980

For examination from 2020

Version 1

Cambridge Pathway

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Contents

Introduction

The main aim of this booklet is to exemplify standards for those teaching Cambridge IGCSE Mathematics 0580 and Cambridge IGCSE (9–1) Mathematics 0980 and to show examples of very good answers.

This booklet contains answers to Specimen Paper 1 (2020), which has been marked by a Cambridge examiner. Each answer is accompanied by a brief commentary explaining its strengths and weaknesses. These examiner comments indicate where and why marks were awarded and how answers could be improved

The Specimen Paper and mark scheme are available to download from the School Support Hub www.cambridgeinternational.org/support.

2020 Specimen Paper 1
2020 Specimen Paper 1 Mark Scheme

Past exam resources and other teacher support materials are also available on the School Support Hub.

Assessment overview

All candidates take two papers.

Candidates who have studied the Core syllabus content, or who are expected to achieve a grade D (4) or below, should be entered for Paper 1 and Paper 3. These candidates will be eligible for grades C to G (1 to 5).

Candidates who have studied the Extended syllabus content and who are expected to achieve a grade C (5) or above should be entered for Paper 2 and Paper 4. These candidates will be eligible for grades A* to E (3 to 9).

Core candidates take:

Paper 1 (Core) — 1 hour, 35%

56 marks

Short-answer questions

Questions will be based on the Core curriculum

Externally assessed

and:

Paper 3 (Core) — 2 hours, 65%

104 marks

Structured questions

Questions will be based on the Core curriculum

Externally assessed

Extended candidates take:

Paper 2 (Extended) — 1 hour 30 minutes, 35%

70 marks

Short-answer questions

Questions will be based on the Extended curriculum

Externally assessed

and:

Paper 4 (Extended) — 2 hours 30 minutes, 65%

130 marks

Structured questions

Questions will be based on the Extended curriculum

Externally assessed

- Candidates should have a scientific calculator for all papers.
- Three significant figures will be required in answers (or one decimal place for answers in degrees) except where otherwise stated.
- Candidates should use the value of π from their calculator or the value of 3.142.

Question 1

Specimen answer

1 Write seventeen thousand and seventeen in figures. ....17017........ [1]

Examiner comment

The error most frequently seen is no zero, 1717, or more than the required one zero. It is also common for candidates to write two distinct numbers, 17 000 17

Mark awarded = 1 out of 1

Question 2

Specimen answer

2 Find the number of minutes from 1758 to 7.13 pm.

7.13 pm is 19 13   2 min + 60 min + 13 min   ....75............ min [1]

Examiner comment

Where the a.m./p.m. system for time needs to be converted, errors are more often seen in converting a p.m. time to the 24-hour clock. Also, a significant number of candidates think there are 100 minutes in an hour.

Although this is only a one-mark question, it is advisable to write down the number of minutes in each section as shown here.

Mark awarded = 1 out of 1

Question 3

Specimen answer

3 The number of cars parked in a car park at 9 am is recorded for 10 days.

124 130 129 116 132 120 127 107 118 114

Complete the stem-and-leaf diagram

10	7	107
11	4 6 8	116 118 114
12	0 4 7 9	124 129 120 127
13	0 2	130 132

Key: 12|3 represents 123 cars

[2]

Examiner comment

It is recommended that candidates complete questions with stem-and-leaf diagrams in two stages, where the first task is to go through the data putting each item against the correct row, as shown here. Then it is a simple task to order the data in each row.

Mark awarded = 2 out of 2

Question 4

Specimen answer

4 **(a)** Write 6789 correct to the nearest 100. ....6800............ [1]

(b) Write 6789 correct to 3 significant figures. ....6790............ [1]

Examiner comment

(a) Candidates are generally good at rounding up where appropriate, although occasionally some candidates omit one or even two zeros, resulting in 680 or 68.

(b) As with rounding numbers, the same applies where candidates are asked to correct a number to the required significant figures, where the answer 678 would occasionally be given. However, the answer 6780 would be less common since it is a basic rule to round up in such a situation.

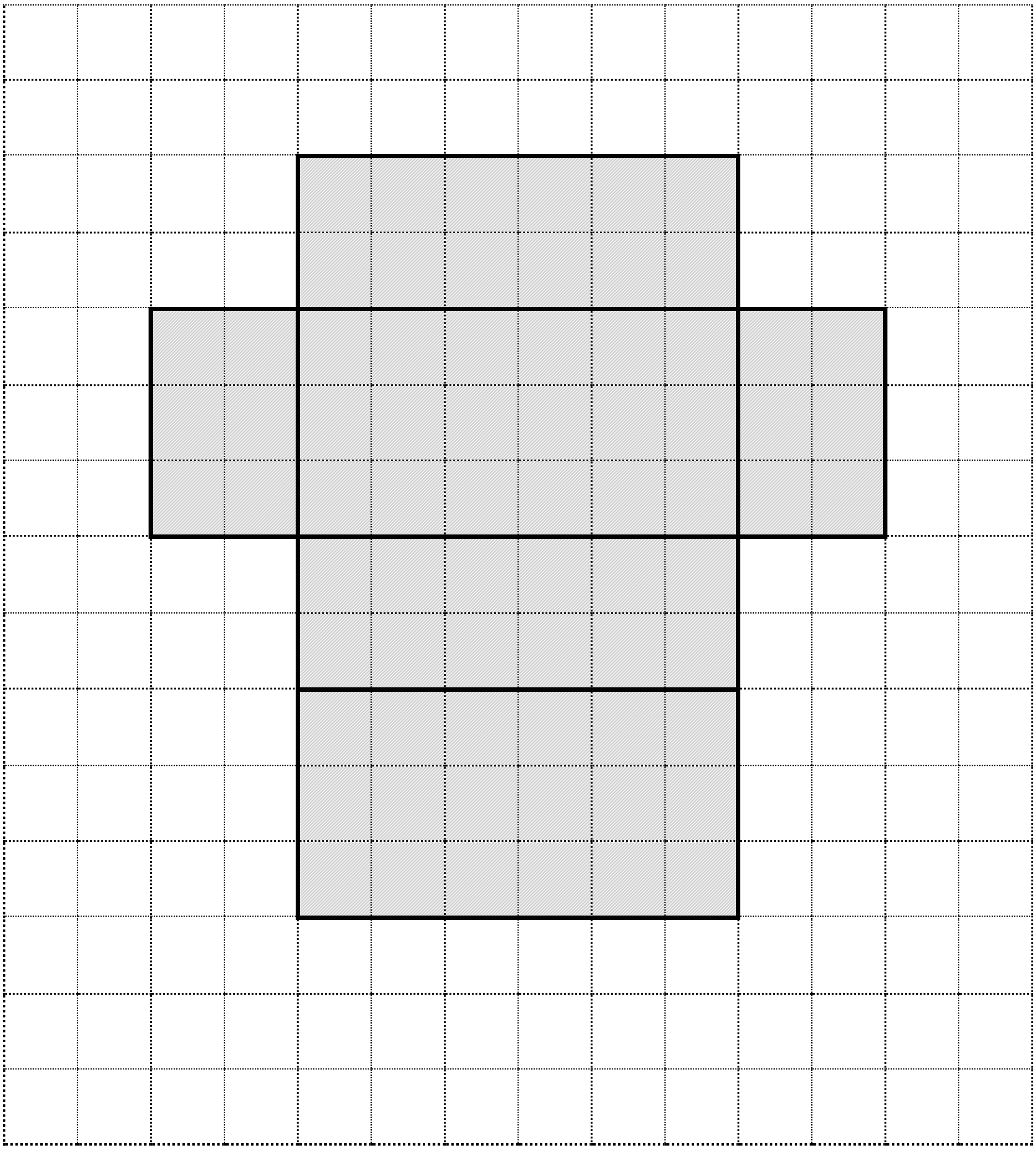
Mark awarded = 2 out of 2

Question 5

Specimen answer

5 A cuboid measures 6 cm by 3 cm by 2 cm.

On this 1 cm^2 grid, draw a net of the cuboid. [3]



Examiner comment

When drawing the net of a solid it is common for candidates to forget to include the full number of rectangles or other necessary shapes. In this case, it is usually the top missing so only five rectangles are drawn.

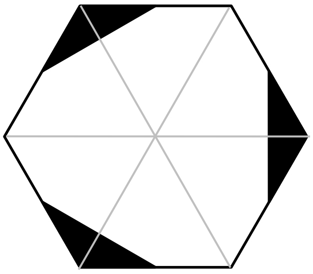
Candidates should check that adjacent edges of pairs of rectangles are equal in length when drawing a net, and ruled lines are essential for full marks.

Mark awarded = 3 out of 3

Question 6

Specimen answer

6



(a) Write down the order of rotational symmetry of the shape. ....3........ [1]

(b) Draw all the lines of symmetry on the shape. [1]

Examiner comment

In general, candidates seem to be more familiar with line symmetry than with rotational symmetry. The lines must be ruled and be within the shape.

Mark awarded = 2 out of 2

Question 7

Specimen answer

7 **(a)** Write down a fraction which is equivalent to $\frac{3}{5}$.

$\frac{6}{10}$ [1]

(b) Write down the reciprocal of 7.

$\frac{1}{7}$ [1]

Examiner comment

(a) No working is necessary for an equivalent fraction. Here, the numerator and denominator have been multiplied by 2, which is the most straightforward method, but any equivalent fraction would be acceptable.

(b) Again, the majority of candidates should gain this mark. Some candidates make unnecessary work for themselves by changing it to a decimal. However, if that is done it must be to at least three decimal places, such as 0.143 or 0.1428.

Mark awarded = 2 out of 2

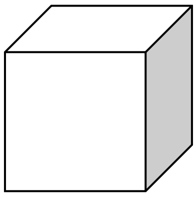
Question 8

Specimen answer

8 A cube has a volume of $1000\,\text{cm}^3$.

Calculate the surface area of the cube.

Side of the cube = $\sqrt[3]{1000}$ = 10 cm



Area of 1 side = $10 \times 10 = 100$
Area of the 6 sides = 6×100

600 cm^2 [3]

Examiner comment

Many candidates find it harder to go from a volume to a side than the reverse, namely that cube root is less familiar than cube. As with question 5, candidates need to be aware that the solid has six faces. A small sketch of a cube in the working space, as shown here, could help those finding it difficult to visualise what is required for surface area.

Mark awarded = 3 out of 3

Question 9

Specimen answer

9 Dan either walks or cycles to school.

The probability that he cycles to school is $\frac{1}{5}$.

(a) Write down the probability that Dan walks to school.

$1-\frac{1}{5}$

$\frac{4}{5}$ [1]

(b) There are 200 days in a school year.

Work out the expected number of days that Dan cycles to school in a school year.

$\frac{1}{5} \times 200$

40 [1]

Examiner comment

(a) This type of question depends on knowing that the probability line goes from 0 to 1. Many questions asking for probability result in responses greater than 1. Most candidates would not show working for subtracting a simple fraction from 1, although it has been done here and this makes the question clear and therefore easier to identify the answer. While probability can be expressed in other forms, it is sensible to give it in the same form as the question, as errors can occur quite often in moving to an alternative form.

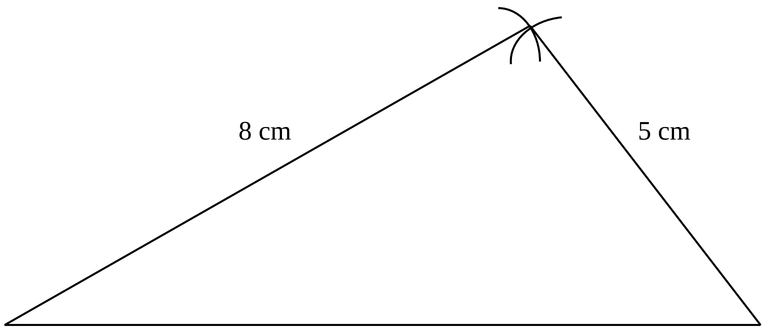
(b) Many candidates find expectation quite difficult to understand. They need to appreciate that probability of one-fifth means one-fifth of the times Dan cycles. It would be helpful to write out clearly what the question is asking, as has been done here. Another potential error in questions of this type is to use the probability answer to part (a) instead of the original probability in the question, so it is important that candidates read the questions carefully.

Mark awarded = 2 out of 2

Question 10

Specimen answer

10 **Using a ruler and pair of compasses only**, construct a triangle with sides 5 cm, 8 cm and 10 cm.
Leave in your construction arcs.



[2]

Examiner comment

In this question, all three sides are to be constructed (often a base is given) so the first thing to do is to make the longest length horizontal and with enough room left for the other sides above it, which has been done here. A pair of intersecting arcs must be seen for two marks, as stated in the question, even if a perfect triangle without arcs is formed. The advice is to make the arcs just as clear as the lines of the triangle; one arc and just a dot on it for the other length is not enough as the question requires arcs (plural).

Mark awarded = 2 out of 2

Question 11

Specimen answer

11 Here is a list of numbers.

Put a ring around the number with the largest value.

0.3030	$\frac{1}{3}$	0.0330	$\frac{3}{10}$	33%	[1]
	0.333		0.3	0.33	

Examiner comment

Comparing sizes of items in a mixture of forms may need some working shown for some candidates. This is easiest by showing all the items as decimals, as shown here. When this is done it is relatively straightforward to order them or, as in this case, identify the largest value.

Mark awarded = 1 out of 1

Question 12

Specimen answer

12 Complete these statements.

(a) 6 m is the same length as ......6000...... mm. [1]

1 m = 1000 mm

(b) 7000 cm^2 is the same area as ......0.7...... m^2. [1]

$1 \text{ cm} = 0.01 \text{ m}$

$1 \text{ cm}^2 = 0.01^2 \text{ m}^2 = 0.0001 \text{ m}^2$

$7000 \text{ cm}^2 = 7000 \times 0.0001 \text{ m}^2$

Examiner comment

(a) Knowledge of the relation between units of the decimal system is all that is required to answer this part. Here, these have been written out clearly so as not to get confused or miss out a zero.

(b) This question requires candidates to change square units, something which many candidates find difficult to visualise and therefore get wrong in examinations. Here, they have been written out clearly so as not to get confused or miss out any zeros.

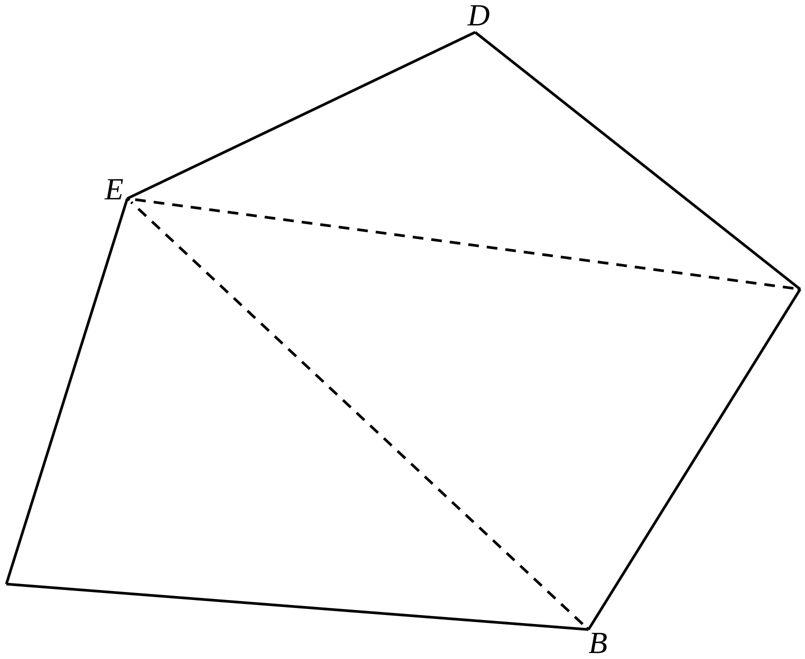
It may be helpful for candidates to first think about the length, where 100 cm = 1 m, and then square both to get 100^2 cm^2 = 1^2 m^2. However, candidates still need to divide to get the equivalent in m^2 of 7000 cm^2, namely a very small number for the answer.

Mark awarded = 2 out of 2

Question 13

Specimen answer

13



ABCDE is a pentagon.

Explain why the diagram shows that the sum of the interior angles of a pentagon is 540°.
Do not measure any angles.

Sum of angles of a triangle is 180°. The pentagon is divided into 3 triangles. $3 \times 180 = 540°$ [1]

Examiner comment

This question requires knowledge of the sum of the angles in a triangle, and it also illustrates a straightforward method for finding the sum of the angles in a polygon. Although candidates can give the answer ‘3 × 180 = 540’, which will gain the mark in this case, usually when the command is ‘explain’ it is better to give a worded justification as well as a calculation, as shown here.

Mark awarded = 1 out of 1

Question 14

Specimen answer

14 Simplify $x^3y^4 \times x^5y^3$.

$$x^{(3+5)}y^{(4+3)}$$

x^8y^7 [2]

Examiner comment

This question tests the addition rule for expressions with indices. Sometimes there is just one letter in the question (e.g. $x^3 \times x^4$), but there can be more, and in this question there are two letters. Here, the working has been shown, which is always helpful as it allows candidates to see, step-by-step, what needs to be done and check for errors.

Some candidates may feel that a further combination of the x and y is needed and produce answers such as $(xy)^{15}$ or even $(xy)^{56}$, but this isn't required.

Mark awarded = 2 out of 2

Question 15

Specimen answer

15 Write 2020 in standard form. 2.02×10^3 [1]

Examiner comment

When converting a number into standard form, candidates need to know that the figures are written with a decimal after the first figure (so a number between 1 and 10) and the power of 10 is the number of figures in the whole number after the decimal. Should the final zero be included in the answer it is referred to as a trailing zero and its inclusion is not penalised.

Mark awarded = 1 out of 1

Question 16

Specimen answer

16 Kim knows that one angle of an isosceles triangle is 48°.
He says that one of the other angles **must** be 66°.

Explain why Kim is wrong.

Isosceles triangles have two equal angles. The equal angles could be 48˚.

$180 - (2 \times 48) = 84°$ [2]

Examiner comment

With two marks available, and two full lines for the answer, this indicates that a written explanation as well as figures is required. Candidates have to state that an isosceles triangle has two equal angles and give a calculation with 48° as the angle that is repeated, showing that 66° is not the only possibility.

Mark awarded = 2 out of 2

Question 17

Specimen answer

17 Explain why $\sqrt{3}$ is irrational.

A rational number can be written as a fraction. $\sqrt{3}$ cannot be written as a fraction. [1]

Examiner comment

The answer has to state that a rational number is one which can be written as a fraction in its simplest terms, and $\sqrt{3}$ cannot be written in this way.

Many candidates struggle with questions regarding irrational numbers, and these are often the questions that are omitted. Here, the question asks to *explain* rather than just *identify* irrational numbers, so candidates need to know the properties of the different types of numbers.

Mark awarded = 1 out of 1

Question 18

Specimen answer

18 The mass, m kilograms, of a horse is 429 kg, correct to the nearest kilogram.

Complete this statement about the value of m.

$429 + 0.5 = 429.5$
$429 - 0.5 = 428.5$

428.5 $\leqslant m <$ 429.5 [2]

Examiner comment

Many candidates find lower and upper bounds difficult. When asked to correct to the nearest 'something', that 'something' should be halved and that value then subtracted and added to the original value. In this case, it is to the nearest kilogram and this has been halved (0.5 kg) and then that half a kilogram has been subtracted and added to the original value.

The boundaries are 429 ± 0.5 so 428.5 and 429.5 are the answers. The upper value of 429.5 is correct because the symbol used is < so the boundary is not included. One mark is awarded for each of the boundaries.

Mark awarded = 2 out of 2

Question 19

Specimen answer

19 Rearrange the formula $5w - 3y + 7 = 0$ to make w the subject.

$$5w = 3y - 7$$

$w = \dfrac{3y - 7}{5}$ [2]

Examiner comment

The first step in all formula re-arrangement is to isolate the term including the subject letter. Here, $3y$ has been added and 7 subtracted to both sides of the formula to produce an expression for $5w$. Both sides have been divided by 5 to obtain the correct answer.

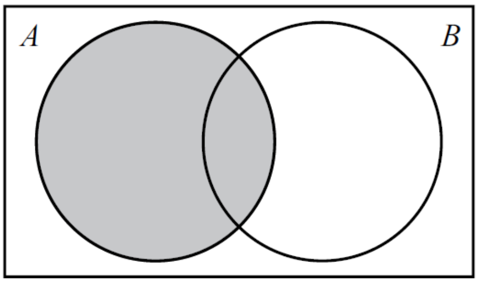
Mark awarded = 2 out of 2

Question 20

Specimen answer

20 Use set notation to describe the shaded regions in each Venn diagram.

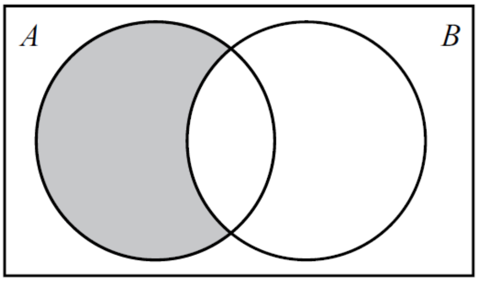
(a) $\mathscr{E}$



The shaded region is inside the whole of *A*.

A [1]

(b) $\mathscr{E}$



The shaded region is inside *A*, but outside *B*.

$A \cap B'$ [1]

Examiner comment

This question is about identifying shaded regions. Perhaps the best approach is to describe in words what the shaded region shows, as has been done here, and then translate that into set notation.

Mark awarded = 2 out of 2

Question 21

Specimen answer

21 The radius of a sphere is 5.2 cm.

Work out the surface area of this sphere.

[The surface area, A, of a sphere with radius r is $A = 4\pi r^2$.]

$$A = 4 \times \pi \times 5.2^2 = 339.7946614$$

339.8 cm^2 [2]

Examiner comment

Substitution into a formula is a simple calculator operation but it is recommended to write out the formula with the value of the radius substituted, as has been done here. By doing this, one mark is already gained even if something goes wrong in the calculation, although it very rarely does when the substitution is written down. Candidates should be using a calculator that has a π key, so they should use that for the calculation.

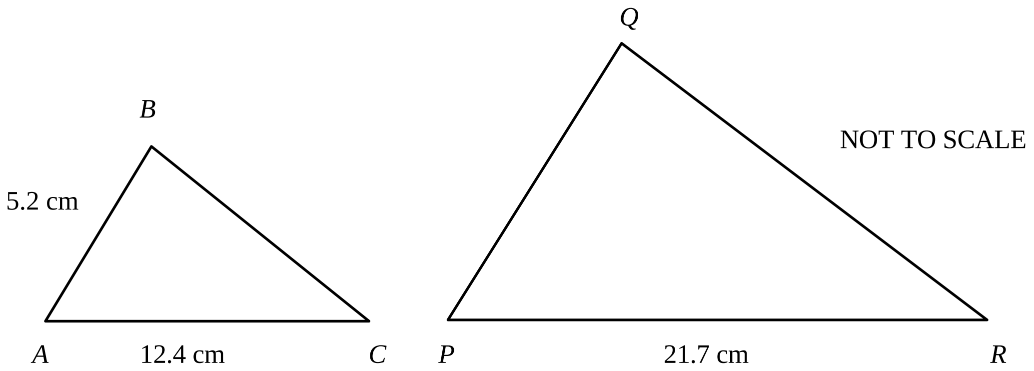
Although it is helpful for candidates to know that π is a little more than 3, the use of 3.14 or $\frac{22}{7}$ will not give the required accuracy for most questions.

Mark awarded = 2 out of 2

Question 22

Specimen answer

22 Triangle *ABC* is similar to triangle *PQR*.



Find *PQ*.

Scale factor from corresponding sides *AC* and *PR* is $21.7 \div 12.4 = 1.75$

$PQ = 5.2 \times 1.75$

PQ = ... 9.1 .... cm [2]

Examiner comment

The scale factor from the measurements of the same sides of the triangles (*AC* and *PR*) has been identified, and the figure obtained (1.75) has been used to multiply the measurement of *AB* to correctly find the measurement of *PQ*.

In questions of this type, it may be helpful for candidates to think in terms of the diagram showing an enlargement. Therefore, finding a scale factor (21.7 ÷ 12.4 in this case) may avoid the common error in questions of this type of doing a subtraction (21.7 – 12.4) instead of a division. Also, candidates should take into consideration whether the length they are calculating is larger or smaller than the corresponding given length. While these diagrams are not to scale they are very close to being in the correct proportion so here the answer has to be more than 5.2 cm.

Mark awarded = 2 out of 2

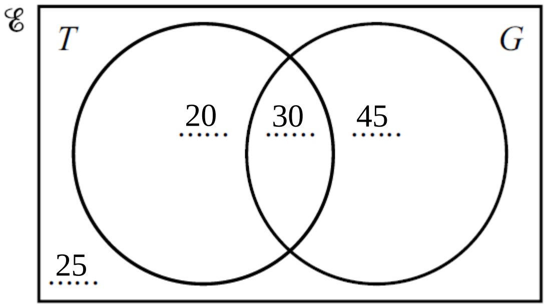
Question 23

Specimen answer

23 $\mathscr{E}$ = {children who go to the park}
T = {children who play tennis}
G = {children who play golf}

120 children go to the park.
50 play tennis.
75 play golf.
25 do not play tennis or golf.

(a) Complete the Venn diagram.



Total in sets T and G is 120 – 25 = 95

The number in both T and G (play tennis and golf)
= tennis + golf – (total tennis + golf)
= 50 + 75 − 95 = 30

Tennis only = 50 – 30 = 20
Golf only = 75 – 30 = 45 [2]

(b) Find n($T \cap G$).

n($T \cap G$) = the number of children in both sets (intersection). ....30............ [1]

Examiner comment

This set theory question requires sorting the numbers in each section of the Venn diagram.
The last data given (25 do not play tennis or golf) is the only one that can be immediately written on the diagram. This leaves 95 to be divided into the three sections inside the circles. With the totals of 50 in tennis and 75 in golf, there must be 50 + 75 – 95 in both sets. With this it can be calculated how many are in both sets (play both tennis and golf) and from there calculated how many play only tennis or golf, and correctly completed the Venn diagram.

Mark awarded = 3 out of 3

Question 24

Specimen answer

24 **(a)** Factorise completely $18x - 24$.

Common factor is 6

$6(3x - 4)$ [1]

(b) Simplify $(w^5)^4$.

$w^{(5 \times 4)}$

w^{20} [1]

Examiner comment

(a) This question only requires one common factor, a number in this case, which has been identified and the correct final answer given.

Care must be taken to ensure the highest common factor is taken, rather than a lower common factor such as 2 or 3.

(b) This question requires multiplication of the indices. For candidates tempted to give the answer w^9 it might be worth re-writing the question as $w^5 \times w^5 \times w^5 \times w^5$, and then adding the indices, or simplifying it to $w^{(5 \times 4)}$ as shown.

Mark awarded = 2 out of 2

Question 25

Specimen answer

25 **Without using your calculator**, work out $1\frac{7}{12} + \frac{13}{20}$.

You must show all your working and give your answer as a mixed number in its simplest form.

$$1\frac{35}{60} + \frac{39}{60} = 1\frac{74}{60}$$

$$1 + 1\frac{14}{60} = 2\frac{14}{60}$$

Alternative method:

$$\frac{19}{12} + \frac{13}{20} = \frac{95}{60} + \frac{39}{60}$$

$$\frac{134}{60} = 2\frac{14}{60}$$

$2\frac{7}{30}$ [3]

Examiner comment

The first step in any addition of fractions is to find a common denominator. The most convenient is the lowest common denominator, but this is not essential.

$1\frac{7}{12}$ can be written as an improper fraction or left as a mixed number, but if the latter, the ‘1’ must not be forgotten.

One mark is awarded for a correct common denominator and the other marks can only be awarded by showing a correct addition of two fractions with common denominators. Two correct methods, with workings, are shown here.

Mark awarded = 3 out of 3

Question 26

Specimen answer

26 By rounding each number correct to 1 significant figure, estimate the value of $\sqrt{\dfrac{90\ 006}{10.01^2}}$.

You must show all your working.

$$\sqrt{\frac{90\ 000}{10^2}} = \sqrt{\frac{90\ 000}{100}} = \sqrt{900}\ .$$

.................30................. [2]

Examiner comment

This answers systematically shows how each given value has been rounded, firstly from 90 006 to 90 000, then 10^2 to 100. The given value has been estimated by dividing 90 000 by 100 and finding the square root of that answer.

When a question asks candidates to round numbers in order to find an estimate, no marks can be awarded for just the answer if the question states that you must show all your workings, even if the answer is correct. Mistakes are often made in rounding by lack of care with the correct order of the numbers and missing out a zero.

Mark awarded = 2 out of 2

Question 27

Specimen answer

27 **(a)** The nth term of a sequence is $n^3 - 5$.

Write down the first three terms of this sequence.

$1^3 - 5, \quad 2^3 - 5, \quad 3^3 - 5$

−4 , 3 , 22 [2]

(b) Here is a sequence of numbers.

3, 6, 11, 18, 27, …

Find an expression for the nth term of this sequence.

1st differences between terms are 3, 5, 7, 9,
2nd difference is always 2, indicating n^2.
Sequence for n^2 is 1, 4, 9, 16, 25, ...
2 has to be added to each of these to form the required sequence.

$n^2 + 2$ [2]

Examiner comment

(a) While it is possible to simply find these terms without showing any working, it is easy to make errors. Writing the expression three times with 1, 2 and 3 for n will lessen the chance of errors such as $1^3 = 3$. Only two marks are awarded even though three answers are required, since the second and third terms require the same skill and do not involve a negative solution.

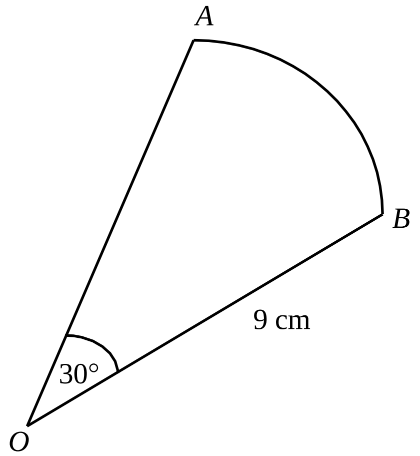
(b) This is clearly not a linear sequence since the difference is not common. If the squares of the first five numbers were listed the sequence would probably be realised, as by just adding 2 to those squares gives the terms in the sequence. Alternatively, the method of differences will lead to a second difference of 2, indicating n^2 as part of the required expression.

Mark awarded = 4 out of 4

Question 28

Specimen answer

28



OAB is a sector of a circle with radius 9 cm and centre *O*.
The angle at *O* is 30°.

Calculate the area of this sector.
Give your answer in terms of π.

Area of the full circle = $\pi \times 9^2 = 81\pi$

The sector is $\frac{30}{360}$ of the area.

$$\frac{30}{360} \times 81\pi$$

6.75π cm² [2]

Examiner comment

This question is regarding the area of a sector, so requires knowledge of area of a circle. Using the basic fact of 360° at the centre of a circle, first find the area of a circle and then multiply that by the fraction $\frac{\text{given angle}}{360}$, as shown here.

Mark awarded = 2 out of 2

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