DULWICH COLLEGE
FOUNDED 1619

Mathematics
Specimen Paper A Mark Scheme

Time allowed for this paper 60 minutes

Instructions

- Attempt all the questions.
- Do all your written work on this paper, **showing all your working**.
- Calculators must not be used.
- The numbers in square brackets are the marks available for each part of a question.
- You must not write in the squares at the bottom right of each page.
- There are 100 marks in total.

1. Calculate 546 + 287.

$$\begin{array}{r} {}^{1}\,{}^{1} \\ 546 \\ +\ 287 \\ \hline 833 \end{array}$$

M1 A1

Answer: 833 [2]

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2. Calculate 546 – 287.

$$\begin{array}{r} {}^{4}\,{}^{13} \\ 5\not{4}\not{6} \\ -\ 287 \\ \hline 259 \end{array}$$

M1 A1

Answer: 259 [2]

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3. Calculate 546 × 4.

$$\begin{array}{r} 546 \\ \times\quad 4 \\ \hline 24 \\ 160 \\ +\ 2000 \\ \hline 2184 \end{array}$$

M1 A1

Answer: 2184 [2]

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4. Calculate 2184 ÷ 7.

$$7\overline{)2^{2}1\,8^{1}4} \quad 312$$

M1 A1

Answer: 312 [2]

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5. Calculate how much bigger 3¼ is than 1¾, writing your answer as a **decimal**.

$$\begin{array}{r} 3{\cdot}25 \\ +\ 1{\cdot}75 \\ \hline 1{\cdot}5 \end{array}$$

M1 A1

Answer: 1·5 [2]

Page total: 10

6. Fill in the missing numbers of these sequences:

(a) 14 , 17 , 20 , 23 , 26 , 29 (A1)

(b) 14 , 13.25 , 12.5 , 11.75 , 11 , 10.25 (A2)

[3]

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7. (a) Work out ¼ of 48. $48 \div 4$ (A1)

Answer: 12 [1]

(b) Work out ½ of ⅓ of ¼ of 48.

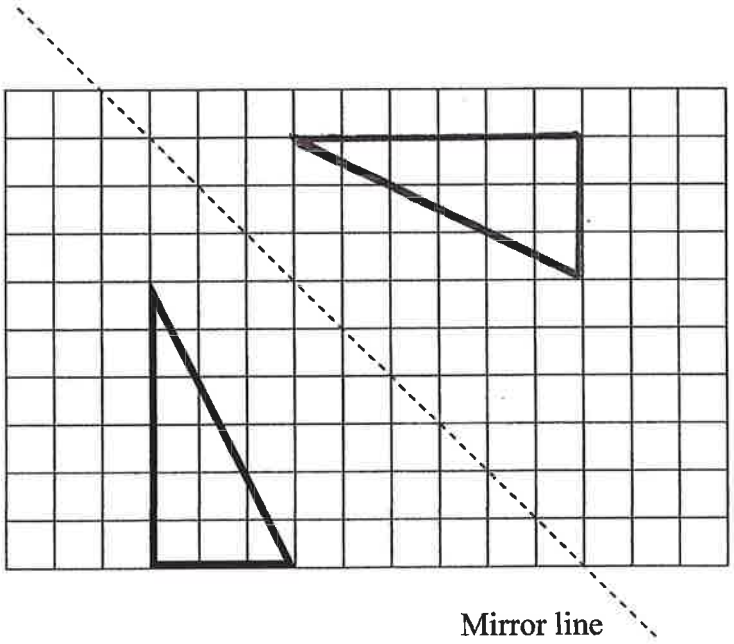
12 → 4 → 2 (M1) ANY SENSIBLE

(A1)

Answer: 2 [2]

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8. Draw the reflection of this triangle in the mirror line shown.



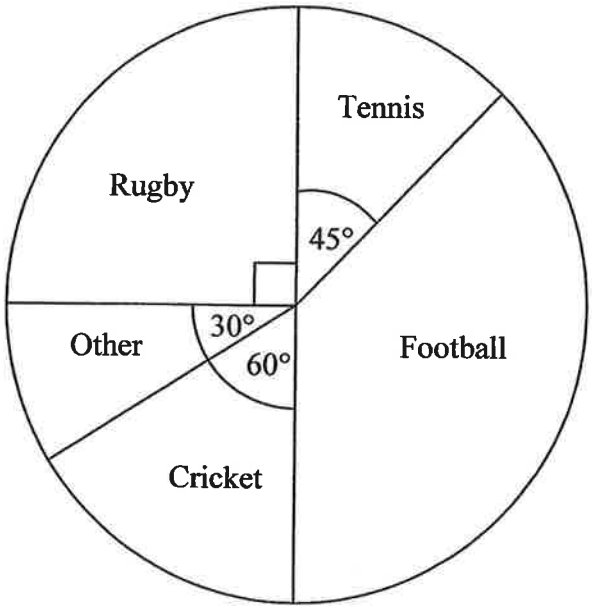
(A1) ORIENTATION AND SIZE

(A1) POSITION OF AT LEAST 2 VERTICES

[2]

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9. The pie chart below represents data collected in a survey by a PE teacher about the favourite sports of a sample of school children.



(a) Write down the fraction of the school children who liked tennis, giving your answer in its lowest form.

$\frac{45}{360}$ M1

A1

Answer: $\frac{1}{8}$ [2]

(b) A total of 240 children were asked to complete the survey. Calculate how many of the children preferred cricket.

$\frac{60}{360} = \frac{1}{6}$ M1 ANY EQUIVALENT

$\frac{1}{6} \times 240$

A1

Answer: 40 [2]

(c) Estimate how many children would say their favourite sport was football out of the whole school of 1200 pupils.

$\frac{135}{360} = \frac{3}{8}$ B1 "135" or 3/8

$\frac{3}{8} \times 1200$ M1

A1

Answer: 450 [3]

10. I buy 6 bags of chocolate coins from a shop and count the number of coins in each bag. The quantities were as follows:

8, 7, 11, 6, 9, 7

(a) Write down the mode of the quantities.

6, 7, 7, 8, 9, 11

Answer: 7 [1] A1

(b) Work out the mean (average) of the number of chocolate coins.

$\frac{6+7+7+8+9+11}{6}$ M1 SUM M1 DIVISION

$= \frac{48}{6}$

Answer: 8 [3] A1

(c) Work out the range of the quantities in the 6 bags.

11 − 6 M1 SUBTRACTION

Answer: 5 [2] A1

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11. A multipack of 12 cans of Ned's Cola costs £6.95.

A single can of Ned's Cola costs 65 pence if bought individually.

Calculate how much cheaper it is to buy a multipack of 12 cans than to buy 12 cans individually, giving your answer in pence.

65 × 12 = 780 M1 MULTIPLICATION

$$\begin{array}{r} 7.80 \\ -\ 6.95 \\ \hline 0.85 \end{array}$$ M1 SUBTRACTION

Answer: 85 pence [3] A1

Page total: 9

12. Arrange the following fractions in numerical size order, starting with the smallest.

$\frac{3}{10}, \frac{1}{5}, \frac{3}{2}, \frac{1}{20}, \frac{1}{4}$

$\frac{6}{20}, \frac{4}{20}, \frac{30}{20}, \frac{1}{20}, \frac{5}{20}$

B1 FOR EITHER OF THE END-VALUES

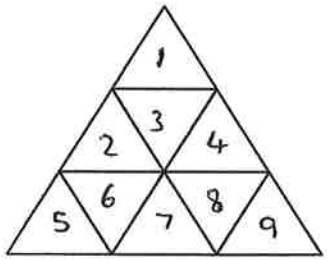
M1 USING COMMON DENOMINATOR

A1

Answer: $\frac{1}{20}$, $\frac{1}{5}$, $\frac{1}{4}$, $\frac{3}{10}$, $\frac{3}{2}$ [3]

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13. (a) An equilateral triangle is divided into smaller equilateral triangles as shown below. State out how many angles of 60° there are in the diagram.



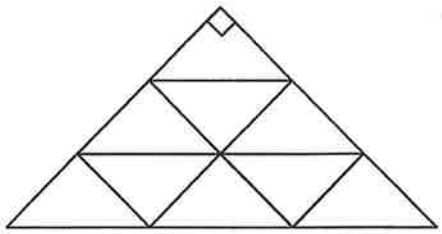
M1

9 x 3

A1

Answer: 27 [2]

(b) The diagram is now squashed to make the top angle 90°, turning all the triangles into right-angled isosceles triangles. Calculate how many acute angles there are in the diagram now.



M1 ANY SENSIBLE

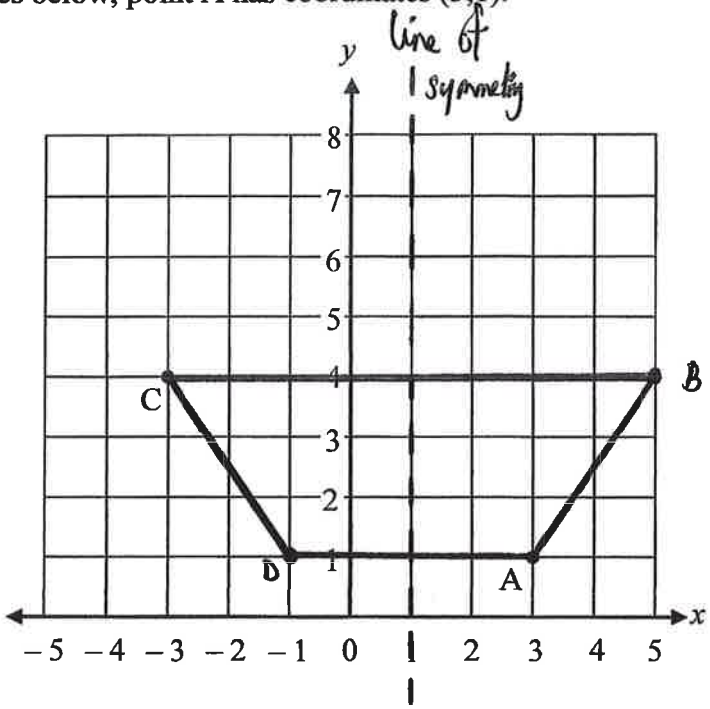
9 x 2

A1

Answer: 18 [2]

Page total: 7

14. On the axes below, point A has coordinates (3,1).



Line of symmetry

(a) Write down the coordinates of point C.

A1

Answer: (-3 , 4) [1]

(b) Plot the point with coordinates (5, 4) onto the axes **and label it B.**

A1 MUST LABEL

[1]

(c) Plot another point, D, and then join ABCD **in that order** so that you form a quadrilateral shape with one line of symmetry.

A1 CORRECT x - COORD.

A1 CORRECT y - COORD.

OK IF NOT JOINED

[2]

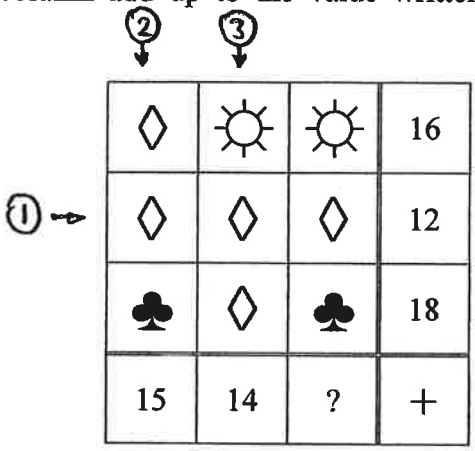
(d) Write down the common name for the quadrilateral ABCD.

A1

Answer: TRAPEZIUM [1]

Page total: 5

15. Each shape in this grid is hiding a particular number so that the three shapes in any row or column add up to the value written at the end of that row or column.



Work out the number that should replace the question mark.

① → ◊ = 4 M1

② → ♣ = 7

③ → ☼ = 6

4 + 6 + 7 M1

OR APPROPRIATE EQUIVALENT METHOD.

A1

Answer: 17 [3]

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16. Rhys and Sarah are on their bicycles and start 90 miles apart on a road, riding towards each other. Rhys is travelling at 10 mph and Sarah is travelling at 20 mph. They set off at the same time and both keep moving at constant speeds until they meet.

(a) Work out what distance each rider has cycled by the time they meet.

10 + 20 = 30

20 + 40 = 60

30 + 60 = 90

A1

Rhys: 30 miles

A1

Sarah: 60 miles [2]

OR M1 FOR SENSIBLE METH WITHOUT EITHER ANSWER

(b) Write down the time taken for them to meet.

10 × 3 = 30

A1 UNITS NOT REQUIRED

Answer: 3 hrs [1]

Page total: 6

FOLLOW THROUGH MARKS AVAILABLE

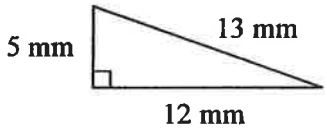
17. (a) Find the area of the rectangle shown below.



20×60 M1

Answer: 1200 A1 mm^2 [2]

George cuts the rectangle up into an exact number of right-angled triangles, each with sides as shown in the diagram below.



(b) Calculate the number of triangles that he cuts from the rectangle.

$4 \times 5 = 20$



$5 \times 12 = 60$ M1

OR APPROPRIATE EQUIVALENT METHOD eg. CALCULATING AREA



M1 $2 \times 4 \times 5$

Answer: 40 A1 [3]

(c) Find the combined perimeter of all the triangles that have been cut from the rectangle.

$5 + 12 + 13 = 30$ M1 PERIMETER OF 1 TRIANGLE

$30 + 40$ M1 MULTIPLICATION. FOLLOW THROUGH (b).

A1 FOLLOW THROUGH.

Answer: 1200 mm [3]

(d) Convert this distance from millimetres into metres.

A1 FOLLOW THROUGH

Answer: 1·2 m [1]

Page total: 9

18. On the island of Pythageuleria all vehicle number plates have 2 letters from the selection A, B, C, D, followed by a number 1, 2, 3 or 4.

For example:

AD 1 **AD 4** **CA 3** **DD 2**

Note that repeated letters are allowed.

(a) Calculate how many plates start with a double B.

BB 1
BB 2
BB 3
BB 4

Answer: 4 (A1) [1]

(b) Calculate how many plates there are that start with any repeated letter.

AA x4
BB x4
CC x4
DD x4

4x4

(M1) ANY SENSIBLE

Answer: 16 (A1) [2]

(c) Calculate how many plates contain just one vowel and an odd number.

AB
AC
AD
BA
CA
DA
} 6 VOWELS

6x2

(M1) FOR 3x2 VOWELS
(M1) FOR x2 ODDS

1, 3: 2 ODDS

Answer: 12 (A1) [3]

(d) Given that there are 64 possible codes in total, calculate what fraction of the number plates have their two letters in alphabetical order, giving your answer in its lowest form.

AB
AC
AD
BC
BD
CD
} x4

6x4 = 24

$\frac{24}{64}$

(M1) LISTING ⇒ 6 LETTER OPTIONS

(M1) MULTIPLY BY 4 AND FORMING FRACTION

$\frac{3}{8}$ (A1)

Answer: $\frac{3}{8}$ [3]

Page total: 9

19. A new design for a novelty watch gives the time in 24-hour clock format by showing a particular combination of lights below a set of numbers. The lit-up numbers are added together to find the actual time, with the first row showing the hour and the second row displaying the minutes.

For example, the display below represents the time 05:26 since:

	32	16	8	4	2	1
Hr				☼		☼
Mn		☼	☼		☼	

← 4 + 1 = 5
← 16 + 8 + 2 = 26

(a) Write down the time (in 24-hour format) represented by the display:

	32	16	8	4	2	1
Hr			☼	☼	☼	
Mn	☼	☼				☼

8+4+2 = 14
32+16+1 = 49

M1 ADDITION

A1

Answer: 14 : 49 [2]

(b) Mark the grid below to show the time "a quarter to ten in the evening".

↳ 21:45 M1 IF SEEN

	32	16	8	4	2	1
Hr		✱		✱		✱
Mn	✱		✱	✱		✱

← A1 ALLOW 8 AND 1 IF NO CONFLICTING WORKING
← A1

[3]

(c) Calculate how long it is between the times displayed on watch A and watch B below:

Watch A

	32	16	8	4	2	1
Hr			☼		☼	☼
Mn	☼			☼		☼

11·37

Watch B

	32	16	8	4	2	1
Hr		☼		☼		
Mn		☼		☼	☼	

20·22

A1 TIMES FROM EITHER/BOTH WATCHES WRITTEN DOWN

19 7+
20·22
- 11·37
8·45

M1 SUBTRACTION

A1

Answer: 8 hours, 45 minutes [3]

Page total: 9

20. In four years time, Sam will be twice as old as he was four years ago. Calculate Sam's current age.

$s + 4 = 2 \times (s - 4)$

$s + 4 = 2s - 8$

$12 = s$

M1 ANY SENSIBLE

A1

Answer: 12 years old [2]

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21. A packet containing seeds says it produces white, pink and blue flowers in such a proportion that, on average, for every one white flower grown there will be two pink and three blue flowers.

(a) I plant some seeds and get three white flowers. Write down how many blue flowers I should expect to grow.

3×3

A1

Answer: 9 [1]

(b) I plant a total of 30 seeds in another patch of the garden. Calculate how many white flowers I would expect to get in this patch.

$1 + 2 + 3 = 6$

$30 \div 6 = 5$

M1 ANY SENSIBLE

A1

Answer: 5 [2]

(c) In another area of the garden, 24 blue flowers are grown. Calculate how many pink flowers I should expect to find here.

$24 \div 3 = 8$

$8 \times 2 = 16$

M1 SCALE FACTOR

M1 MULTIPLICATION

A1

Answer: 16 [3]

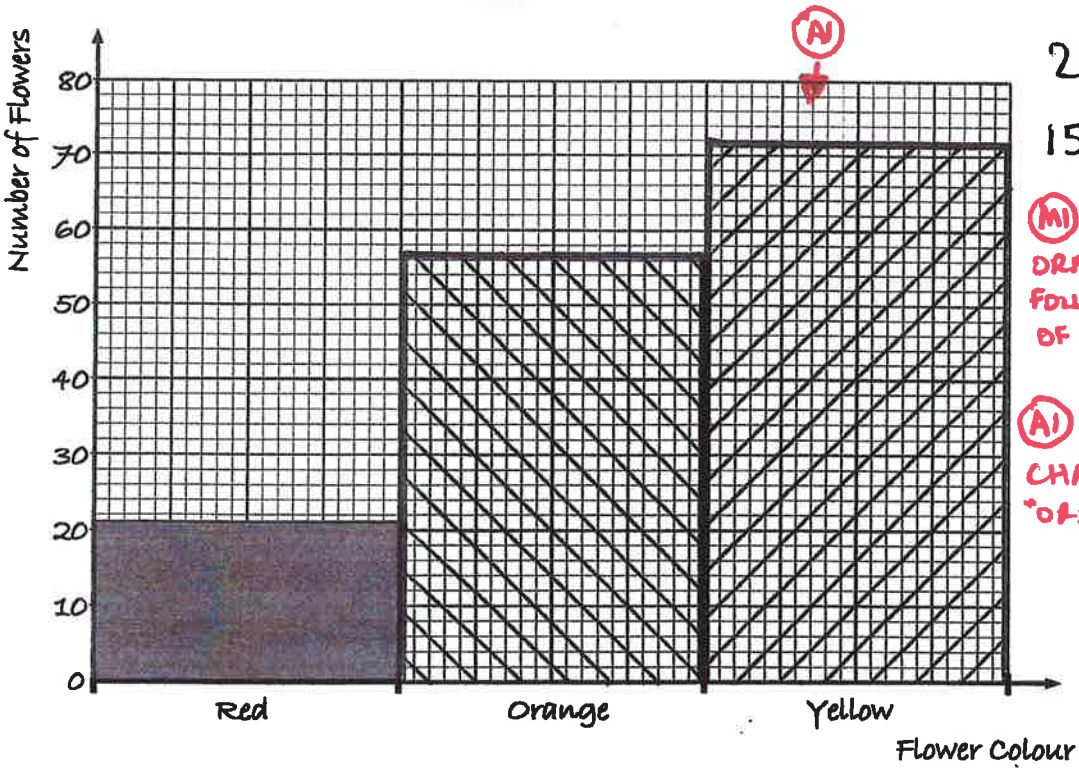
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21. continued...

A packet of a different type of seed produces red, orange or yellow flowers. Some students in a biology class plant 150 seeds. All 150 grow to produce flowers and the students draw up the results of the flower colours into a table and a bar chart as below.

(d) Complete the table and bar chart for the students' findings.

Flower colour	Red	Orange	Yellow
Number of flowers	21 (A1)	57	72



(A1)

21 + 72 = 93

150 − 93 = 57

(M1) CALCULATING ORANGE. ALLOW FOLLOW THROUGH OF "RED" VALUE.

(A1) TABLE AND CHART FOR "ORANGE"

[4]

(e) If I pick a flower at random from the 150 grown in the test, list the following possible outcomes in order of likelihood, starting with the least likely:

(i) picking a red or orange flower 78
(ii) picking a purple flower 0
(iii) picking a orange or yellow flower 129
(iv) picking a yellow flower 72

(M1) QUANTITIES

(A1)

Answer: (ii) , (iv) , (i) , (iii) [3]

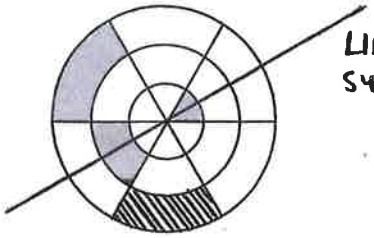
ALLOW ANY EQUIVALENT "NAMING" FORMAT

PURPLE YELLOW RED/ORANGE ORANGE/YELLOW

(A1) PURPLE

Page total: 7

22. (a) Shade in one more section on the grid below so that the overall shape has a single line of symmetry, marking your mirror line on the diagram.

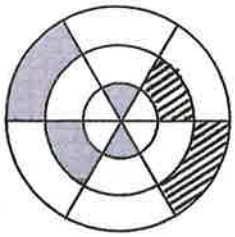


A1 SHADING

A1 MIRROR LINE. ALLOW FOLLOW THROUGH

[2]

(b) Now shade two sections in this second grid so that the overall shape has an order of rotational symmetry of two.

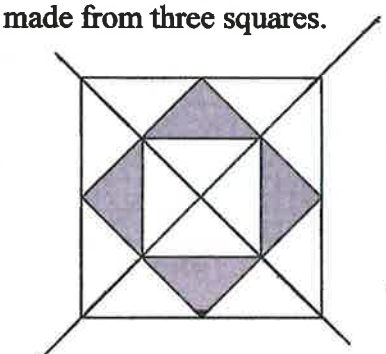


A2

[2]

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23. The diagram below is made from three squares.



Calculate the fraction of the larger square that is shaded, giving your answer in its lowest form.

M1 ANY SENSIBLE METHOD.

$\frac{4}{16}$

M1 FRACTION

A1

Answer: $\frac{1}{4}$ [3]
