M1.

Sketch of possible pentagon with exactly one line of symmetry, integer sides labelled, perimeter ie 15 cm

1 × 7 cm and 4 × 2 cm

1 × 7 cm and 2 × 3 cm and 2 × 1 cm

1 × 5 cm and 2 × 4 cm and 2 × 1 cm

1 × 5 cm and 2 × 3 cm and 2 × 2 cm

1 × 3 cm and 2 × 5 cm and 2 × 1 cm

1 × 3 cm and 2 × 4 cm and 2 × 2 cm

3 × 1 cm and 2 × 6 cm

1 × 1 cm and 2 × 5 cm and 2 × 2 cm

1 × 1 cm and 2 × 4 cm and 2 × 3 cm

5 × 3 cm (but sketch clearly only has 1 line of symmetry)

> *B1*
> *regular pentagon with 5 × 3 cm labelled*
> *or*
> *(impossible) pentagon with sides labelled*
> *eg 1 × 11 cm and 4 × 1 cm*
> *or*
> *pentagon with one line of symmetry and non-integer sides labelled, perimeter 15*
> *Units not needed*

B2

[2]

M2.

C

B1

[1]

M3.(a)   Fully correct constructed circle drawn with radius [5.9, 6.1]

> *B1 for any circle centre P (must be constructed and not freehand)*

B2

(b)   Sector drawn [58°, 62°] degrees

> *B1 for any sector*

B2

[4]

M4.(a)　　A, B and D

> *B1 for 2 correct and no incorrect*

B2

　(b)　　C and D

> *B1 for 1 correct and no incorrect*

B2

[4]

M5.(a)　　*A*, *D* and *E*

> *any order*
> *B1 for 2 correct*
> *or for 2 correct and 1 incorrect*

B2

　(b)　　*C* and *E*

> *any order*
> *B1 for 1 correct*
> *or for 1 correct and 1 incorrect*

B2

　(c)　　*B*

B1

[5]

M6.

　(a)　　Parallel line drawn

> *Acetate will be provided to check that line is within ±2°*

B1

　(b)　　Perpendicular line drawn, any length

*Allow if lines have right angle indicated and line doesn't
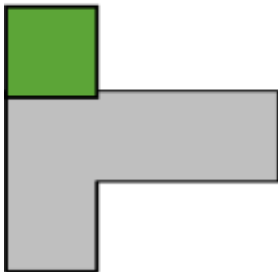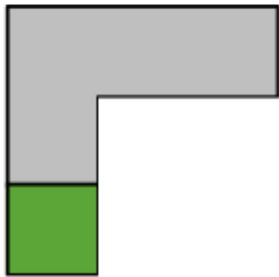appear to be perpendicular.*
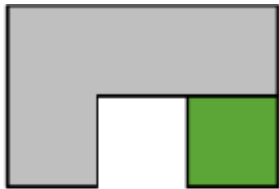
Lines do not have to cross.

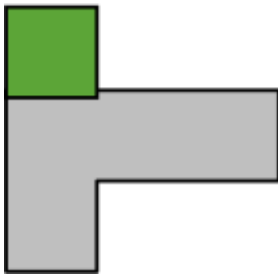*Acetate will be provided to check that line is within ±2°*

B1

[2]

M7.

(a)

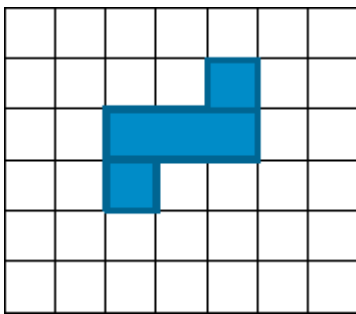*B1 for any of these*

B1

(b)
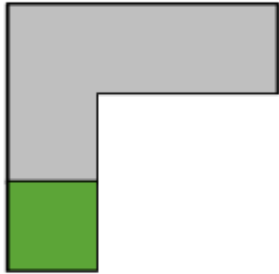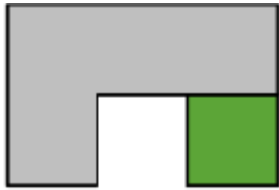
B1 for any of these if different from (a)

B1

(c)

B1

[3]

M8.

(a)　　1 2 4 4
　　　or
　　　1 3 5 5
　　　or

2 3 5 5
or
1 4 6 6
or
2 4 6 6
or
3 4 6 6

B1 a set of 4 numbers between 1 and 6 with a single mode

Or a set of 4 numbers between 1 and 6 with median identified/calculated

SC1 for 1 1 3 3

   or 2 2 4 4

   or 3 3 5 5

   or 4 4 6 6

or 1 1 1 1 or 2 2 2 2 etc (up to 6 6 6 6)

B2

(b) $(1 \times 10) + (2 \times 7) + (3 \times 9) + (4 \times 5) + (5 \times 8) + (6 \times 11)$
Or 10 + 14 + 27+ 20 + 40 + 66

Attempt at $\sum f x$. Allow one error.

M1

Their 177 ÷ 50

Allow their 50 if clear attempt at $\sum f$ is seen.

M1

3.54

Ignore rounding to 3.5 or 4 if 3.54 seen.

4 with no working is M0A0
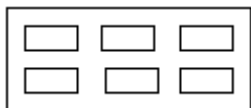
A1

[5]

M9.
(a)   Completely correct diagram
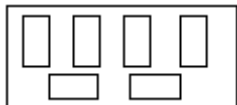
B1   Any one correct section

Allow vertices ± 2mm

B2

(b)   Clear diagram showing 6 (or 7) rectangles. Eg
Two rows of 3 (× 8 cm) across

or
One row of 4 (✗ 6 cm) across and one row of 2 (or 3) (✗ 8 cm) across

> **B1** *Diagram with at least one row of 3 (✗ 8 cm) across*
>
> *or*
>
> *Diagram with at least one row of 3 (✗ 6 cm) across*
>
> *or*
>
> *Diagram with at least one column of 2 (✗ 6 cm) down*
>
> *or*
>
> *Diagram with at least one column of 1 (✗ 6 cm) and 1 (✗ 8 cm) down*

B2

Alternative method 1
Complete explanation. Eg
3 ✗ 8 = 24 and 2 ✗ 6 = 12
or
24 ÷ 3 = 8 and 12 ÷ 2 = 6
or
3 across is less than 25 and
2 down is less than 15

> **B1** *Partial explanation. Eg*
>
> *3 ✗ 8 = 24 or 2 ✗ 6 = 12*
>
> *or*
>
> *24 ÷ 3 = 8 or 12 ÷ 2 = 6*
>
> *or*
>
> *3 across is less than 25 or 2 down is less than 15*

B2

Alternative method 2
(25 ✗ 15) ÷ (8 ✗ 6) = 7.(...)

> *oe*

B1

[4]

M10.

(a)   2

B1

(b)   [5.8 cm, 6.2 cm]   or
[58 mm, 62 mm]
                oe   eg [2.25 inches, 2.45 inches]
                B1   [5.8, 6.2]
                  or
                  [58, 62]
                Units may be incorrect or missing
                or   [2.8 cm, or 3.2 cm]
                    or
                    [28 mm, 32 mm]

B2

(c)   Circle, centre *P*, radius [3.8, 4.2] cm
and
Two radii drawn from *P* each at [43°, 47°] to given line stopping at inner circle (
± 2mm)
                B1   Circle, centre P, radius [3.8, 4.2]cm
                  or
                  Two radii drawn from P each at [43°, 47°] to given line

B2

[5]

M11.(a)   *E* or *DEA* or *AED*

B1

A or *EAB* or *BAE*

B1

C or *DCB* or *BCD*

B1

(b)   Pentagon

B1

[4]

M12.(a)   Valid reason

> *Strand (ii)*
> *eg 14 ÷ 4 is not a whole number*
> *14 is not a multiple of 4*
> *Because you need half centimetres*
> *Half the perimeter has to be even*
> *14 ÷ 4 = 3.5*
> *4 × 3 = 12 and 4 × 4 = 16*

Q1

Additional Guidance

Because it wouldn't have the sides as a whole number

Q1

14 doesn't divide into a whole number

Q0

Not possible because all the sides must be equal

Q0

Nothing divides into 14 4 times (not true)

Q0

Not possible to make 14 using the same number 4 times

Q0

14 ÷ 4 without an answer or correct comment

Q0

The grid is not big enough

Q0

The square would not have equal sides

Q0

(b)   Valid reason

> *Strand (ii)*
> *eg 12 is not a square number*
> $\sqrt{12}$ *is not a whole number*
> *3 × 3 = 9 and 4 × 4 = 16*
> $\sqrt{12}$ *= 3.4... or 3.5*

Q1

Additional Guidance

No number multiplied by itself equals 12

Q1

No whole number multiplied by itself equals 12

Q1

If it was a square it would have to be an area of 16 (not true)

Q0

The length and width would not match each other

Q0

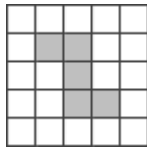It wouldn't have equal sides

Q0

The base can't be timesed by the height to give 12 because the sides need to be equal

Q0

Because 12 as an area would mean sides would be different lengths which would make the shape a rectangle not a square

Q0

(c) Correct shape drawn

Shape shown may be reflected or rotated

> *B1 for a Pentomino with no lines of symmetry and no rotational symmetry*
>
> *B1 for any polyomino with no lines of symmetry and rotational symmetry of order 2*

B2

Additional Guidance

CANDIDATES MUST USE A DIFFERENT SHAPE TO THOSE GIVEN TO SCORE ANY MARKS

Accept any rotation or reflection of shape shown in mark scheme

If candidates do more than one, mark all and award the lowest mark

[4]

M13.(a)   (0)3 05, 15 05, 5 past 3

oe   Ignore any reference to am or pm

B1

(b)   Acute

B1

(c)   12 25

B2 for answer of 11 25 or 12 40
Or (0)9 10 + 3 × 60 + 15 oe
B1 for 10 10 or 11 10 or 12 10 seen
or (0)9 25 or 10 25 seen
or 3 × 60 + 15 oe
All times are oe

B3
[5]

M14.
(a)   A, T and H ticked, S crossed

B1 for 2 or 3 correct

B2

(b)   X and S ticked, A and M crossed

B1 for 2 or 3 correct

B2
[4]