M1.   (a)   See diagram below.
Award **TWO** marks for triangle vertex on or within inner boundary.
Award **ONE** mark for triangle vertex between boundaries
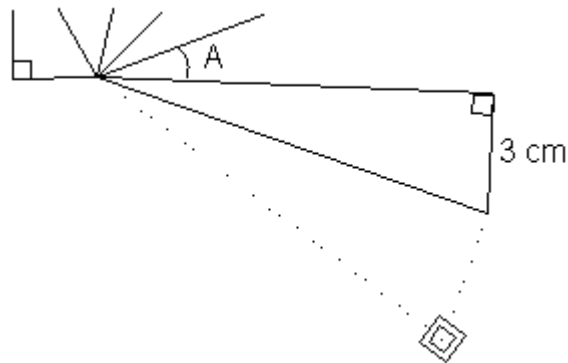or on outer boundary.

*No marks awarded for triangle vertex outside outer
boundary.*

No marks *are awarded for incomplete triangles or triangles
not attached to main diagram,* ***even if*** *vertex is within
prescribed boundaries.*

Up to 2

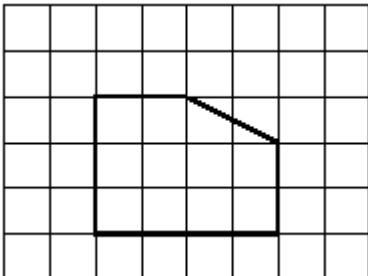(b)   An answer in the range 23° to 27° inclusive.
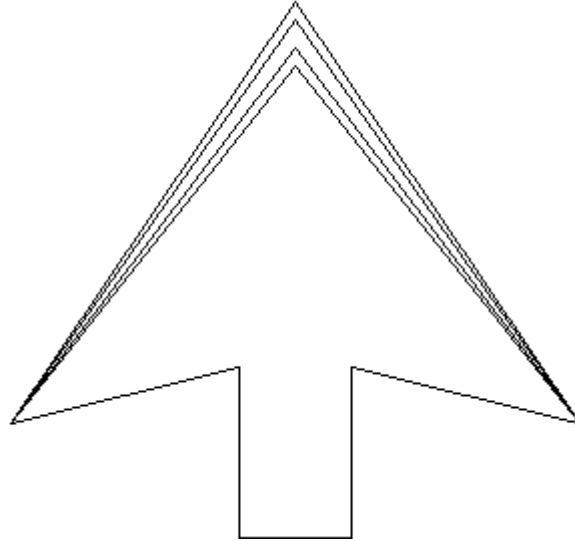*Answer need not be a whole number.*

1

[3]

M2.   Any pentagon which has three right angles, eg

*The shape need not follow grid lines. Allow slight
inaccuracies
in drawing, provided the intention is clear*

[1]

M3. Markers will use an acetate overlay of this page to mark children's answers to this question.


*Award **TWO** marks for completed diagrams which have **BOTH** angles in the range 39° to 41° inclusive, ie all lines drawn within the inner boundary on the above diagram.*

*If this is not the case, award **ONE** mark for diagrams which have **BOTH** angles in the range 38° to 42° inclusive, ie all lines within the wider boundary on the above diagram. The diagram need not be completed.*

Accept slight errors in the completion of the diagram, provided the intention is clear, eg if the lines meeting at the tip of the arrow are slightly too long or too short.

[2]

M4. (a) Line of symmetry drawn as shown.
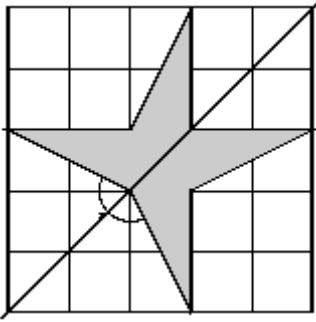
The length of the line is unimportant, provided the intention is clear.

Accept slight inaccuracies in drawing provided the intention is clear.

1

(b) $^1/_5$ **OR** 0.2 **OR** 20%

Accept equivalent fractions, eg $^5/_{25}$

1

(c) Answer in the range of 140 to 146 inclusive.

1

[3]

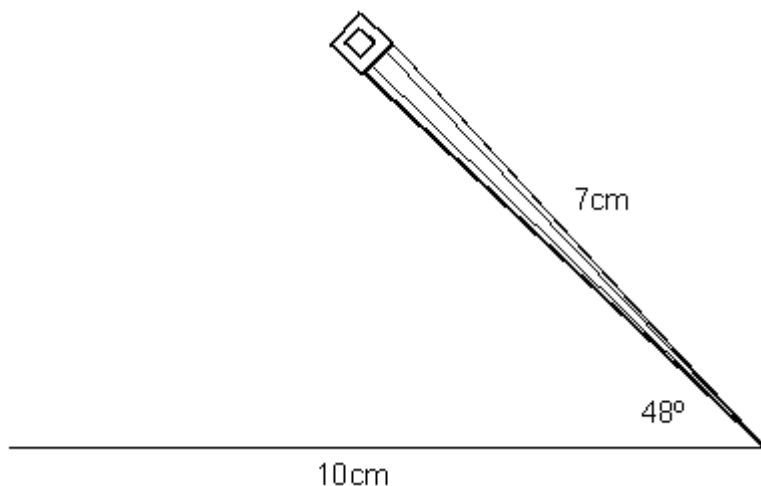**M5.**   (a)   9

1

(b)   30

1

[2]

M6.   Markers will use a transparent overlay of this page to mark children's answers to this question.

Award **TWO** marks for an angle in the range 47°; to 49°; inclusive **AND** a sloping line in the range 6.9 to 7.1 cm inclusive (ie upper vertex of triangle within inner box on diagram) **AND** a completed triangle.

> ***Do not*** *penalise diagrams where any side has been extended past a vertex.*

> *Accept drawings which do not use the given 10cm base line, provided they have used a line with a length in the range 9.9 to 10.1cm inclusive.*

If the answer is incorrect, award **ONE** mark for an angle in the range 46°; to 50°; inclusive **AND** sloping line in the range 6.8 to 7.2cm inclusive (ie upper vertex of triangle within larger box on diagram). Diagram need not be complete.

> *Drawings not using the given 10cm base line, which have a base line outside the range 9.9 to 10.1cm are awarded **ONE** mark provided they have an angle in the range 47° to 49° inclusive **AND** a sloping line in the range 6.9 to 7.1cm inclusive.*

up to 2

[2]

M7. Award **TWO** marks for the boxes ticked and crossed as shown:

☑

✗

✗

☑

If the answer is incorrect, award **ONE** mark for any three boxes ticked or crossed correctly **OR** two boxes correctly ticked and the other two boxes left blank.

Up to 2

[2]

M8. Award **TWO** marks for the correct answer of 18°

Calculation need not be performed for the award of the mark.

If the answer is incorrect, award **ONE** mark for evidence of an appropriate method, eg 90 – 60 – 12

Up to 2

[2]

M9. (a) $x =$ 55°

1

(b) $y =$ 145°

*If the answers for (a) and (b) are transposed, but otherwise correct, award **ONE** mark only, in the (b) box.*

1

[2]

M10.   107

[1]

M11.   Answer in the range 93 degrees to 97 degrees inclusive

[1]

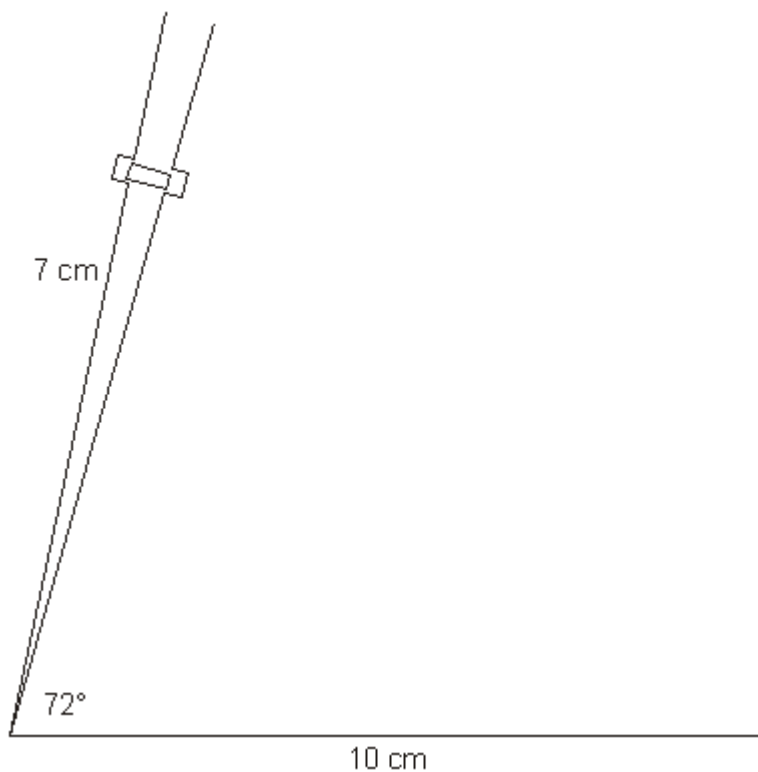**M12.** $x =$ $\boxed{35^{\circ}}$

[1]

M13.   (a)   Answer in the range 126mm to 128mm inclusive.

1

(b)   Answer in the range 21 degrees to 23 degrees inclusive.

1

[2]

M14.   Markers will use a transparent overlay of this page to mark pupils' answers to this question.

7 cm

72°

10 cm

Award **TWO** marks for a triangle drawn with an angle in the range 70° to 74° inclusive **AND** length of sloping line in the range 6.9cm to 7.1 cm inclusive (ie upper vertex of triangle within inner box on diagram).

If the answer is incorrect, award **ONE** mark for:

- a completed triangle drawn with an angle in the range 70° to 74° inclusive.

OR

- a completed triangle drawn with an angle in the range 69° to 75° inclusive **AND** length of sloping line in the range 6.8 cm to 7.2 cm inclusive.

> *Accept drawings where any side has been extended past a vertex.*
>
> *Accept drawings which do not use the given 10 cm base line, provided they have used a line with a length in the range 9.9 cm to 10.1 cm inclusive.*
>
> *Accept for **ONE** mark drawings not using the given 10 cm base line which have a base line outside the range 9.9cm to 10.1 cm, provided they have an angle in the range 70° to 74° inclusive **AND** a sloping line in the range 6.9 cm to 7.1 cm inclusive.*
>
> *Accept for **ONE** mark drawings of incomplete triangles, provided they have an angle in the range 70° to 74° inclusive **AND** a sloping line in the range 6.9 cm to 7.1 cm inclusive.*

M15. An explanation (or diagram) which recognises that the sum of two obtuse angles would be greater than 180 degrees, eg:

- 'An obtuse angle is greater than 90 degrees and the angles of a triangle add up to 180 degrees'

- 'Two obtuse angles add up to more than 180'

- '180 degrees is less than two obtuse angles'

- 'It must have at least two acute angles'

- 'The shape would need more than 3 sides to join up'

-
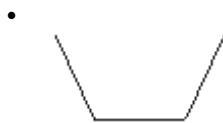
Do not accept answers that refer only to the properties of obtuse angles *OR* to the angles of a triangle, eg:
- *'The angles of a triangle add up to 180 degrees'*
- *'Obtuse angles are greater than 90 degrees'.*

Do not accept vague or incomplete explanations, eg:
- *'A triangle cannot have two obtuse angles'*
- *'Obtuse angles would be too big'*
- *'You can only have acute angles'.*

U1

[1]

M16. (a) 5

1

(b) 270

Accept any answer that is 270 greater than a multiple of 360
*If the answer for (a) is 7 **AND** the answer for (b) is 90, award*
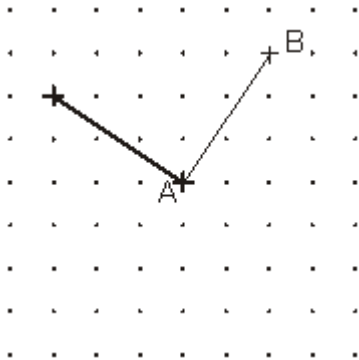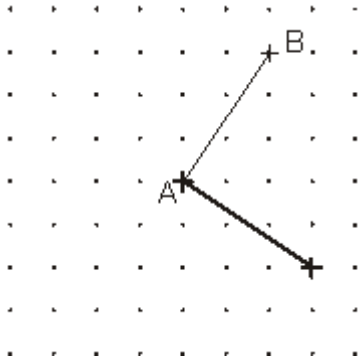
ONE mark only for (b).

[2]

M17. 25

[1]

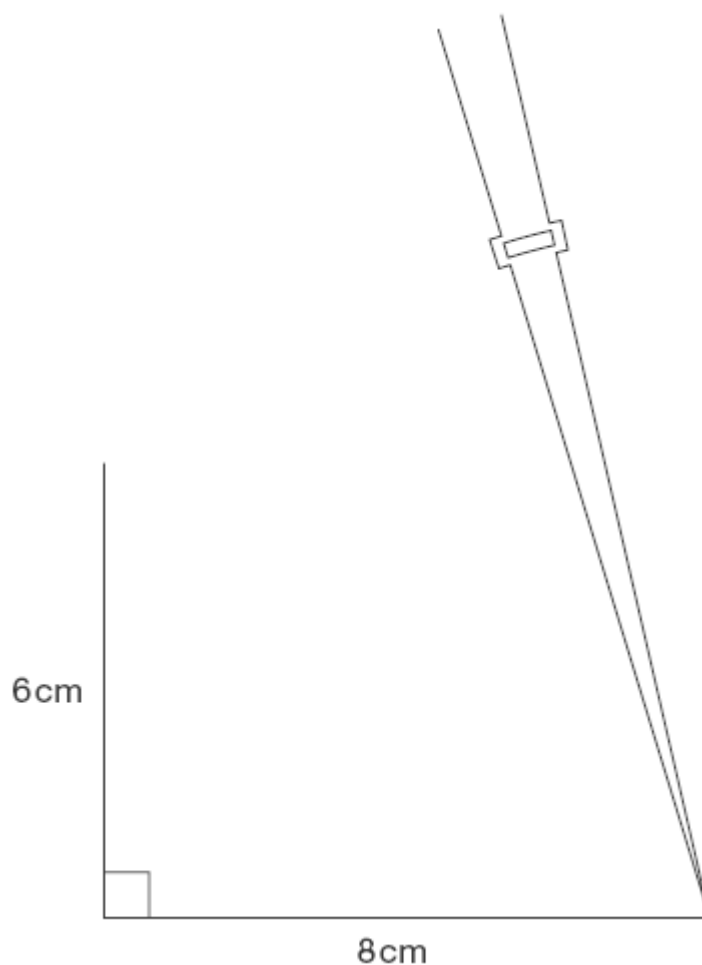**M18.** Line drawn from A to one of the two dots marked as shown:

OR

Accept slight inaccuracies in drawing

[1]

M19. Markers will use a transparent overlay of this page to mark pupils' answers to this question.

Award **TWO** marks for a quadrilateral drawn with an angle in the range 73° to 77° inclusive **AND** length of sloping line in the range 9.1cm to 9.3cm inclusive (ie upper vertex of quadrilateral within inner box on diagram).

If the answer is incorrect, award **ONE** mark for:

• a completed quadrilateral drawn with an angle in the range 73° to 77° inclusive

OR

• a completed quadrilateral drawn with an angle in the range 72° to 78° inclusive **AND** length of sloping line in the range 9.0cm to 9.4cm inclusive.

> *Accept drawings where any side has been extended past a vertex.*
>
> *Accept drawings which do not use the given 8cm base line, provided they have used a line with a length in the range 7.8cm to 8.2cm inclusive.*
>
> *Accept for **ONE** mark drawings not using the given 8cm base line which have a base line outside the range 7.8cm to 8.2cm, provided they have an angle in the range 73° to 77° inclusive **AND** a sloping line in the range 9.1cm to 9.3cm*

*Accept for **ONE** mark drawings of incomplete quadrilaterals,
provided they have an angle in the range 73° to 77° inclusive
AND a sloping line in the range 9.1cm to 9.3cm inclusive.*

Up to 2
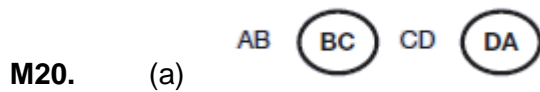
[2]

M20.   (a)   AB (BC) CD (DA)

*Accept alternative unambiguous indications of the correct
lines.*

1

(b)   (AB) BC (CD) DA

*Accept alternative unambiguous indications of the correct
lines.*

1

[2]

M21. 17

*! Answer written on diagram
Accept providing there is no ambiguity*

2

or

73° seen (*one of the other angles in the isosceles triangle*)

OR

Shows or implies a complete correct method, eg:

•   180 − 34 = 144 *(error)*

144 ÷ 2 = 72

90 − 72 = 28 *(error)*

1

[2]

M22. Award **TWO** marks for correct answer of 170°

If the answer is incorrect, award **ONE** mark for evidence of an appropriate method, eg:

- 50 + 50 + 90 = 190

    360 – 190

OR

- 360 – 50 – 50 – 90

    *Answer need not be obtained for the award of **ONE** mark.*

[2]

E1. No comment available.

E2. Problems in this area are associated with the names of polygons. Children were still confusing the terms *pentagon*, *hexagon* and *octagon*.

E3. This question required children to use a protractor to construct two angles of 40° in order to complete an arrowhead. This question was less well done at all levels, due to inaccuracy in the measurement of the angles. Marks were not deducted for failing to join the two lines, provided the angles were constructed accurately, but even with this degree of leniency many children failed to get any marks for their work.

E4. Forty percent of children reaching level 4 and over ninety percent of those reaching level 5 were also able to identify a shaded area of a shape as 1/5 in part (b). However, this question caused problems for children attaining level 3, and their errors suggest a lack of basic comprehension of fractions.

This question asked children to measure an obtuse angle marked on a given diagram. This question was well done by children working at level 5, but of the wide range of answers given by other children, the most common was to measure the acute angle between the horizontal line and one of the arms of the angle. This may suggest an over-emphasis on acute angles in the children's experiences of angular measurement.

E5. No comment available.

E6. 29% (7% at level 3, 24% at level 4 and 63% at level 5) answered this question correctly, gaining both of the two marks available. 12% were awarded a single method mark.

This question assessed ability to use a ruler and angle measurer accurately to construct a triangle. To be successful children had to construct a given angle and draw a triangle. Generally the line was drawn more accurately than the angle indicating less skill in using a protractor. Only children achieving level 5 performed at all well on this. A quarter of children achieving level 3 did not attempt this question.

E7. This question was worth two marks. Children were awarded two marks for correctly identifying whether or not all four statements shown were correct, and one mark for a partially correct response. Perhaps due to its multiple-choice format, omission rates were low for this question.

Generally, children at all three levels were able to identify angle C as an obtuse angle. The most challenging statements were the second and fourth, with just over 60% of children overall answering each correctly. It may be that children were familiar with both obtuse and acute angles. However, the second statement about angle D being acute was more difficult than the statement about the obtuse angle due to the orientation of angle D on the grid. Similarly, the fourth statement about lines AB and AD being perpendicular would have been easier to answer if the lines had been presented horizontally and vertically.

E8. This question requires understanding of the angle properties of equilateral triangles and rectangles, in solving a problem concerning calculation of angles. Children are asked to record their method.

About half of children at level 5 gained both marks for a correct answer. The question was very difficult for children at other levels, with about 10% of children at level 4 answering correctly, and very few children at level 3 giving a correct answer. Almost invariably, a child with a correct method was able to carry it through to a correct conclusion, so it was also rare for any child to receive one mark for this question. The question was omitted by nearly 30% of children at level 3 and nearly 10% of children at level 4.

About 20% of children at level 4, and 10% of children at the other levels gave a value in the range 22°-26° as the answer. This is the answer obtained by measuring the angle in the diagram, although children were told the diagram was not drawn to the correct scale.

Almost half of children at level 5 and one third of those at level 4 recorded methods that suggested they had not used a calculator. This may have been because the calculations required were relatively straightforward once they had been correctly identified.

Two marks awarded for fully correct answer

E9.   This question requires understanding of the angle properties of triangles and of angles on a straight line. Children are required to apply this knowledge to calculate unknown angles.

The first mark for this question was given for working out angle *x.* Three-quarters of children at level 5 gave a correct answer, as did about one-third of those at level 4. The question was difficult for children at level 3, as would be expected of a question assessing angle properties, with less than 5% answering correctly and nearly 20% omitting the question.

A common error was 45° suggesting there may have been an error in calculation. This was made by nearly 15% of children at level 4, 10% at level 3 and 5% at level 5.

About one-third of children at level 5 and nearly 15% of those at level 4 showed working, demonstrating their knowledge of the sum of the angles in a triangle when calculating angle *x.*

Performance rates for the second mark were similar to the first mark, with children at level 5 doing slightly better. Incorrect responses varied and few common trends were seen.

Thirty per cent of children at level 5 and over 10% at level 4 showed working, demonstrating their knowledge of the sum of the angles at a point when calculating angle *y.*

E11. **Target Level: 5**

Curriculum Coverage (POS ref: Ma3/4c, 4b)

This question assesses children's ability to measure accurately one angle of a triangle.

Performance

Over 80% of children working at Level 5 recorded an accurate measurement for the award of one mark. More than half of all children working at Level 4 and over one-fifth of those working at Level 3 were also successful.

Common errors and misconceptions

- The most common error, made by almost 15% of children working at Level 5, was an answer in the range 83° to 87°, suggesting that children had used their protractors inaccurately and read from the wrong scale.

E12. **Target Level: 5**

This question assesses pupils' knowledge of the properties of isosceles triangles. They are required to use this knowledge to calculate the size of one angle in a triangle.

Performance

- Ninety per cent of pupils working at level 5 gave the correct answer, as did more than half of all pupils working at level 4 and 10% of all those working at level 3.

Common errors and misconceptions

- Errors among pupils working at level 5 were varied with no common trends.

- Almost 10% of pupils working at levels 3 and 4 gave an answer that was between 27 and 33 inclusive. These children may have measured the angle with a protractor.

E13.   **Target Level: 4/5**

Curriculum Coverage (POS ref: Ma3/4c, 4b)

The first part of this question assesses pupils' ability to measure accurately a line joining two vertices of a shape. They are required to record their answer in millimetres.

For the second part, pupils are required to use a protractor to measure a given angle within the same shape.

Performance

- Almost 65% of pupils working at level 4 gave a correct answer for the first part of the question, as did over 85% of pupils working at level 5 and almost one-third of those working at level 3.

- For the second part of the question, 90% of pupils working at level 5 were successful. Almost 60% of pupils working at level 4 and nearly one-quarter of those working at level 3 were also awarded the mark.

Common errors and misconceptions

- The most common incorrect response to the first part of the question was 125, just outside the accepted range. These pupils were not quite accurate enough, measuring only to the nearest half centimetre, although they gave the answer in millimetres as required. Over 10% of pupils working at level 4 gave this answer, as did more than 5% of pupils working at level 5 and over 15% of those working at level 3.

- For the second part of the question, an incorrect answer of 20 was given by almost 5% of pupils working at level 5, nearly 10% of pupils working at level 4 and more than 10% of those working at level 3. These pupils gave their answer to the nearest 10 degrees which was not accurate enough to be awarded the mark.

E14.   **Target Level: 5**

Curriculum Coverage (POS ref: Ma3/2c, 4c, 4b)

This question assesses pupils' ability to draw and measure accurately using a protractor

and a ruler. They are required to complete a drawing of a triangle to scale, using a given base line.

Performance

Just over 55% of pupils working at level 5 drew the triangle accurately for the award of two marks. A further 20% gained one mark for a lesser degree of accuracy. Among pupils working at level 4 nearly 20% achieved both marks with almost another 20% receiving one mark.

Common errors and misconceptions

•   Almost a third of pupils working at level 5 drew a triangle whose side was within 2mm of the correct length, but an angle outside the range accepted for two marks. These pupils were able to measure and draw a length accurately but were less accurate at measuring and drawing the correct angle. Forty per cent of these pupils drew an angle within one degree of the accepted range and were therefore awarded one mark.

•   Nearly 10% of pupils at the target level were awarded one mark for drawing a triangle whose angle was within the range accepted for two marks, but whose side was either too long or too short. These pupils were able to measure and draw an angle accurately but were less accurate at measuring and drawing line length.

•   Few pupils were awarded one mark for other variations as allowed in the mark scheme.

•   Of the 25% of pupils working at level 5 awarded no marks, just over three-quarters drew a triangle with the line length in the range 6.8cm to 7.2cm but with the angle outside the range 69 to 75 inclusive. This may have included pupils who accurately drew a 7cm line, but failed to get a mark because their angle was too inaccurate for consideration.

Resource currently unavailable.