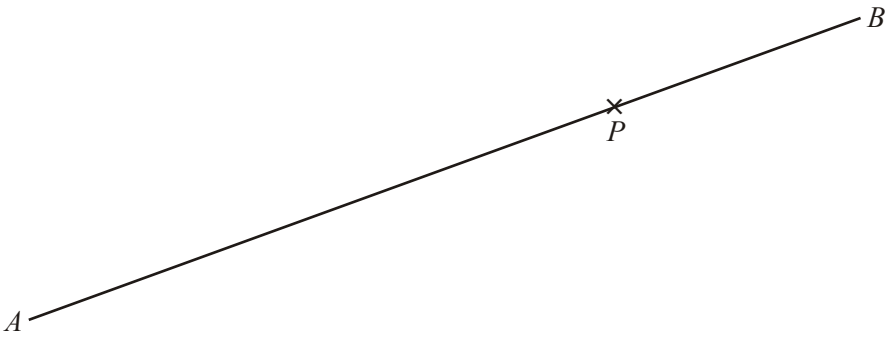
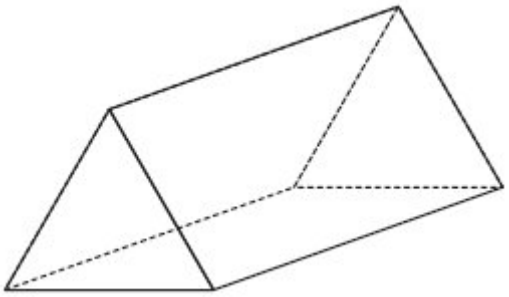
1. Use the ruler and compasses to **construct** the perpendicular to the line segment AB that passes through the point P.
You must show all construction lines.



(Total 2 marks)

2.



The diagram shows a triangular prism.

The cross-section of the prism is an equilateral triangle.

(a) On the diagram, draw in **one** plane of symmetry for the triangular prism.

(2)

(b) In the space below, draw a sketch of a net for the triangular prism.

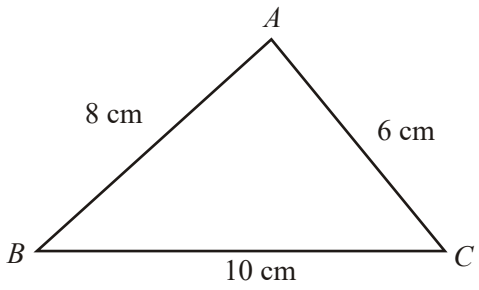
(2)

(c) In the space below, use ruler and compasses to **construct** an equilateral triangle with sides of length 6 centimetres.
You must show all construction lines.
One side of the triangle has already been drawn for you.

(2)
(Total 6 marks)

3.

Diagram **NOT** accurately drawn

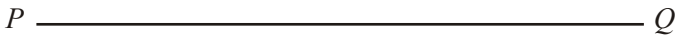


ABC is a triangle.
AB = 8 cm.
AC = 6 cm.
BC = 10 cm.

(a) Use ruler and compasses to construct an accurate drawing of triangle *ABC*.
The line *BC* has been drawn for you.
You must show all your construction lines.

(2)

(b) Use ruler and compasses to construct the perpendicular bisector of the line PQ.
You must show all your construction lines.



(2)
(Total 4 marks)

4.

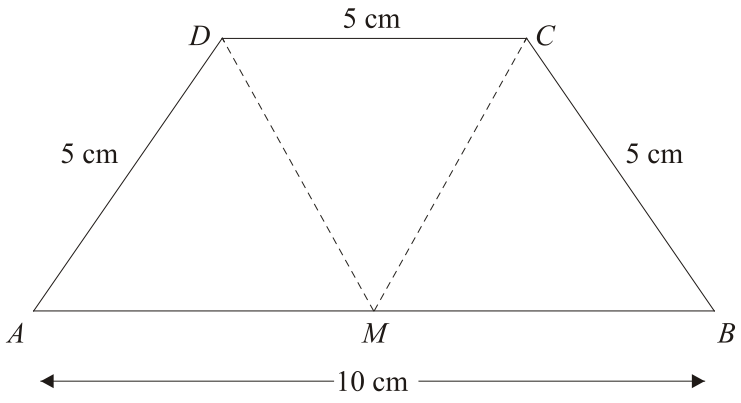
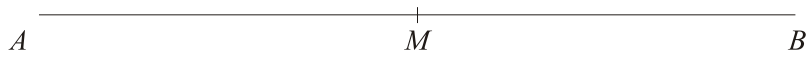


Diagram **NOT** accurately drawn

The diagram shows a trapezium $ABCD$.
$AB = 10$ cm.
$AD = CD = BC = 5$ cm.
M is the midpoint of AB.
It also shows that the trapezium can be split into 3 equilateral triangles.

In the space below, use a ruler and compasses to construct an accurate drawing of the trapezium.
AB has been drawn for you.
You must show all your construction lines.

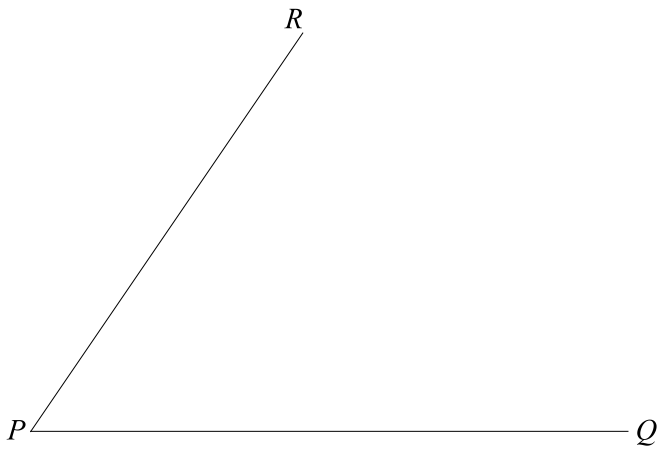


(Total 3 marks)

5. (a) Use ruler and compasses to construct the perpendicular bisector of the line *AB*.
You must show all your construction lines.

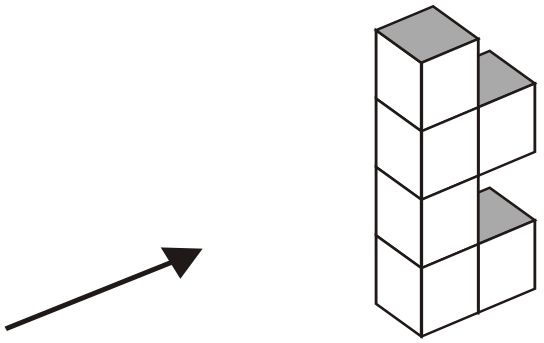
(2)

(b) Use ruler and compasses to construct the bisector of angle *RPQ*.
You must show all your construction lines.

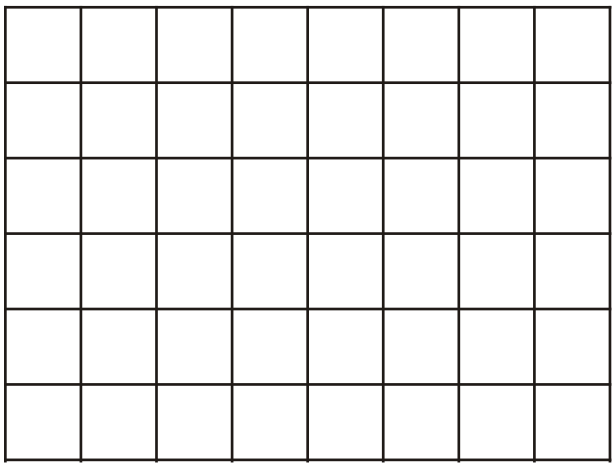


(2)
(Total 4 marks)

6. The diagram shows a solid object made of 6 identical cubes.

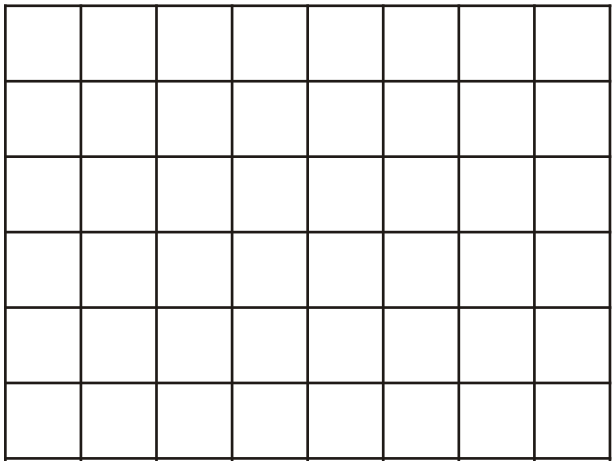


(a) On the grid below, draw the side elevation of the solid object from the direction of the arrow.



(2)

(b) On the grid below, draw the plan of the solid object.

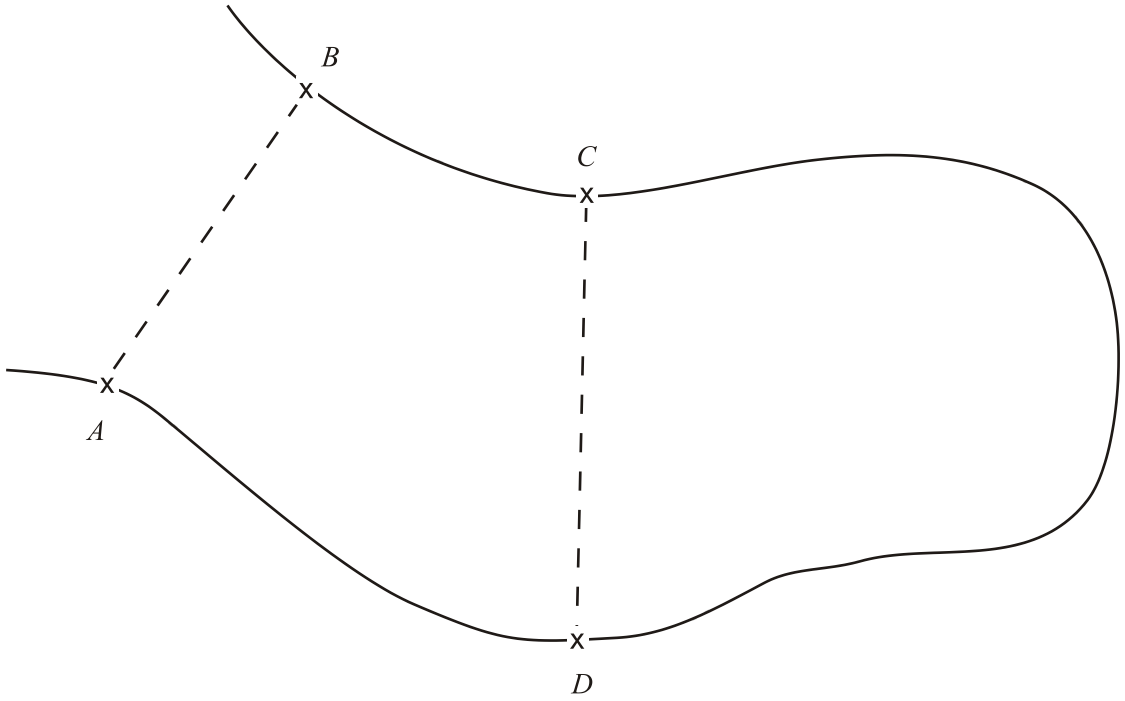


(2)
(Total 4 marks)

7. The map shows part of a lake.

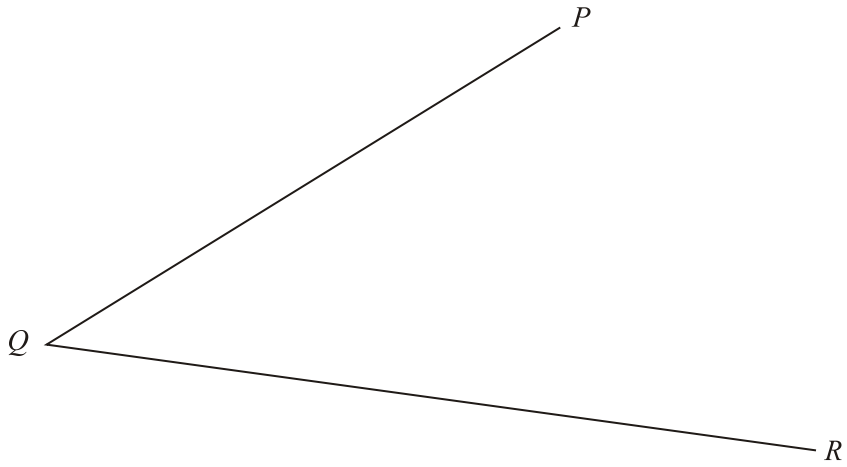
In a competition for radio controlled boats, a competitor has to steer a boat so that
its path between *AB* and *CD* is a straight line
this path is always the same distance from *A* as from *B*

On the map, draw the path the boat should take.



(Total 2 marks)

8.



Use ruler and compasses to **construct** the bisector of angle *PQR*.
You must show all your construction lines.

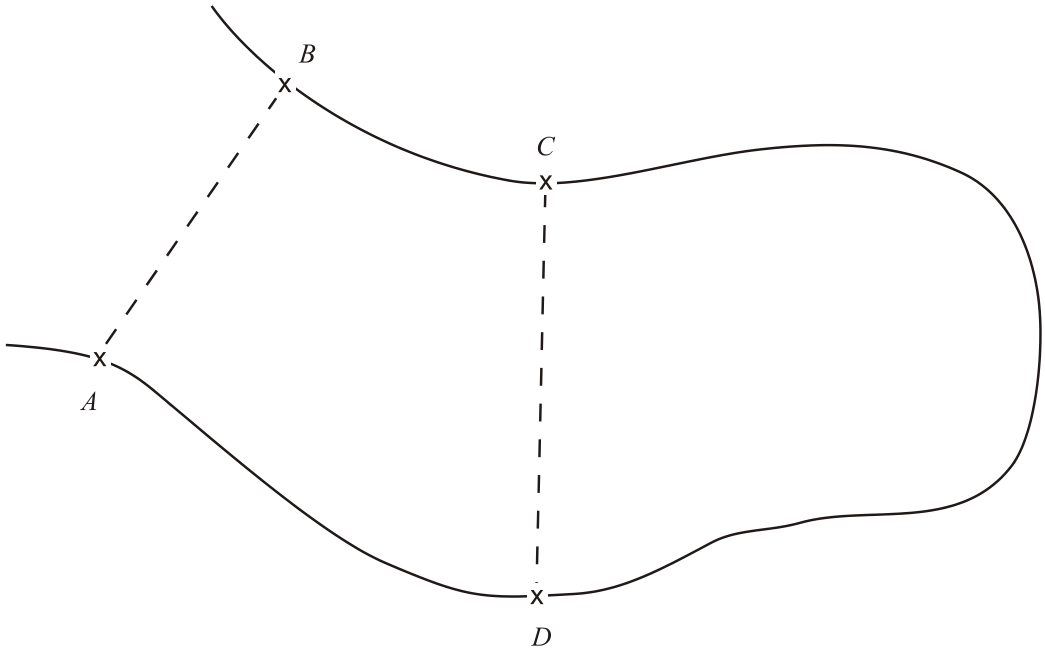
(Total 2 marks)

9. The map shows part of a lake.

In a competition for radio controlled boats, a competitor has to steer a boat so that
its path between *AB* and *CD* is a straight line
this path is always the same distance from *A* as from *B*

(a) On the map, draw the path the boat should take.

Scale: 1 cm represents 10 metres



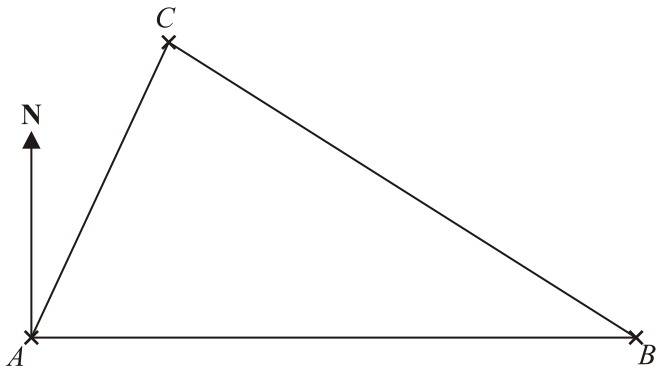
(2)

There is a practice region for competitors.
The practice region is that part of the lake that is less than 30 metres from point *E*.
The scale of the map is 1 cm represents 10 metres.

(b) Shade this practice region on the map.

(2)
(Total 4 marks)

10.



The crosses on the diagram show the positions of three places *A*, *B* and *C*.

The scale of the diagram is 1 cm to 5 km.

(a) Find the actual distance between *A* and *B*.

..... km

(1)

(b) Measure the bearing of *C* from *A*.

.....

(1)

D is a fourth place.

The actual distance of *D* from *A* is 20 km.

The bearing of *D* from *A* is 115°.

(c) Mark with a cross (×) the position of *D* on the diagram. Label the point *D*.

(2)

(Total 4 marks)

11. Use ruler and compasses to **construct** an angle of 30° at *P*.
You **must** show all your construction lines.

P ——————————————

(Total 3 marks)

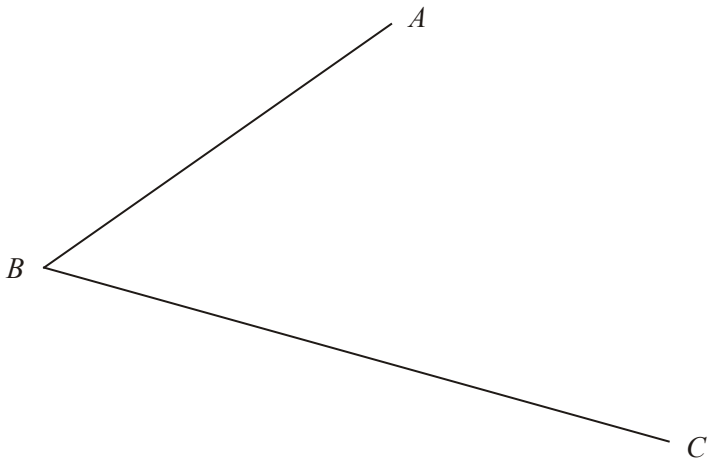
12. In the space below, use ruler and compasses to **construct** an equilateral triangle with sides of length 6 centimetres.
You must show all your construction lines.

One side of the triangle has already been drawn for you.

——————————————

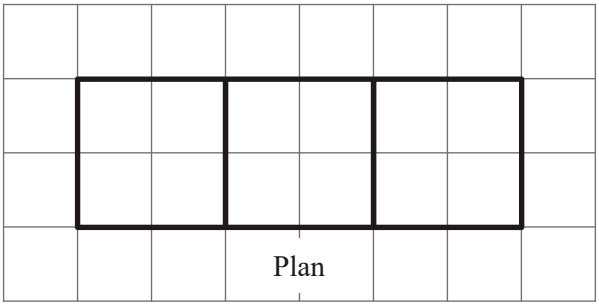
(Total 2 marks)

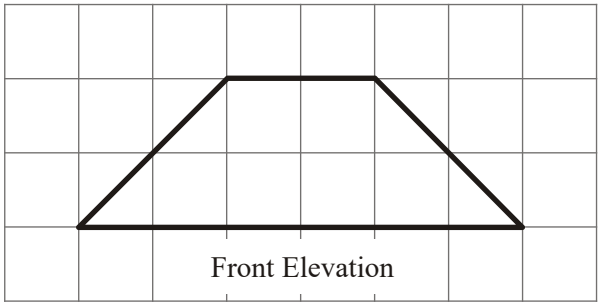
13. Use ruler and compasses to construct the bisector of angle *ABC*.
You must show all your construction lines.



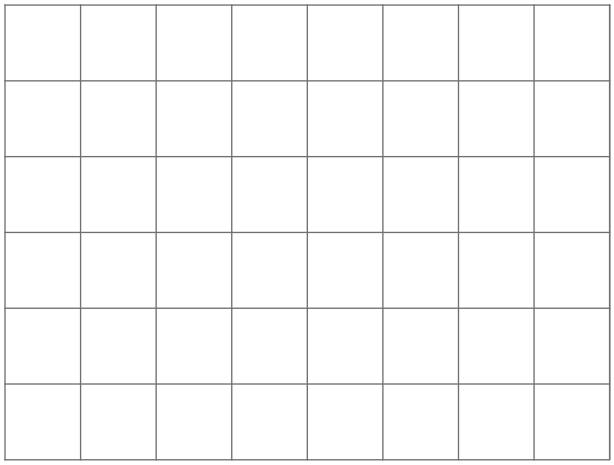
(Total 2 marks)

14. Here are the plan and front elevation of a solid shape.





(a) On the grid below, draw the side elevation of the solid shape.

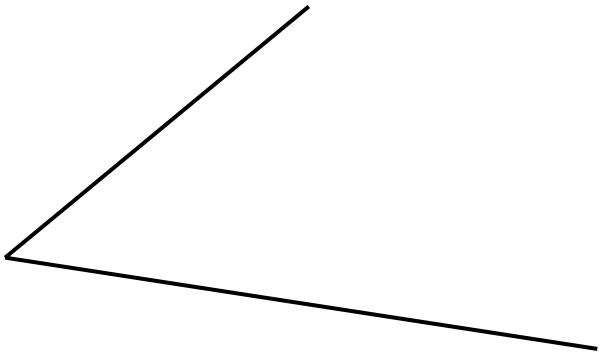


(2)

(b) In the space below, draw a sketch of the solid shape.

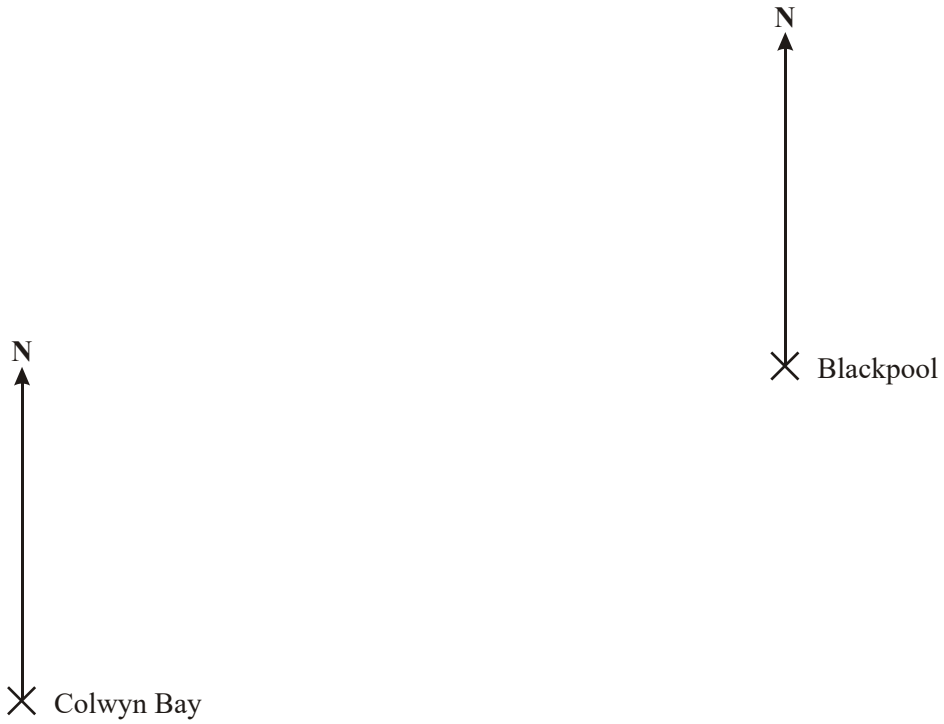
(2)
(Total 4 marks)

15. Use ruler and compasses to **construct** the bisector of this angle.
You must show all your construction lines.



(Total 2 marks)

16. The diagram shows the position of Colwyn Bay and the position of Blackpool.



The bearing of a ship from Colwyn Bay is 032°.
The bearing of the ship from Blackpool is 290°.

In the space above, draw an accurate diagram to show the position of the ship.

Mark this position with a cross ✕. Label is S.

(Total 3 marks)

17.

Use ruler and compass to **construct** the perpendicular bisector of the line segment *AB*.
You must show all construction lines.

(Total 2 marks)

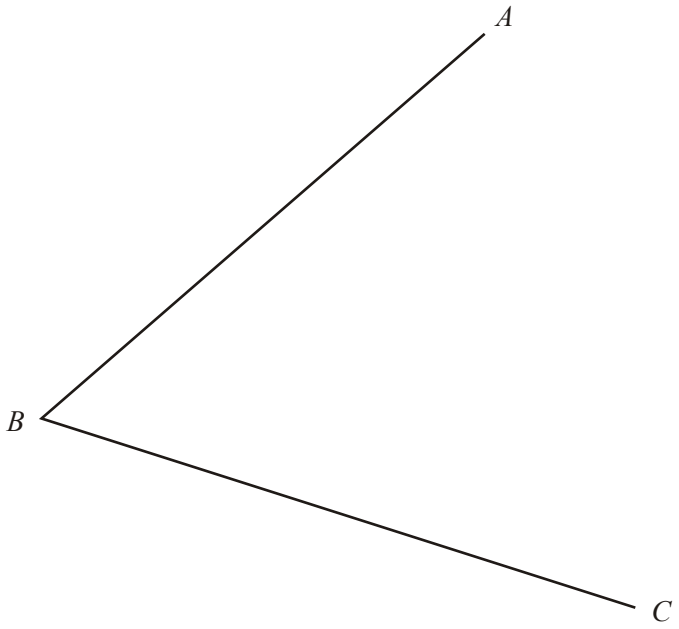
(2)

There is a practice region for competitors.
The practice region is that part of the lake that is less than 30 metres from point *E*.
The scale of the map is 1 cm represents 10 metres.

(b) Shade this practice region on the map.

(2)
(Total 4 marks)

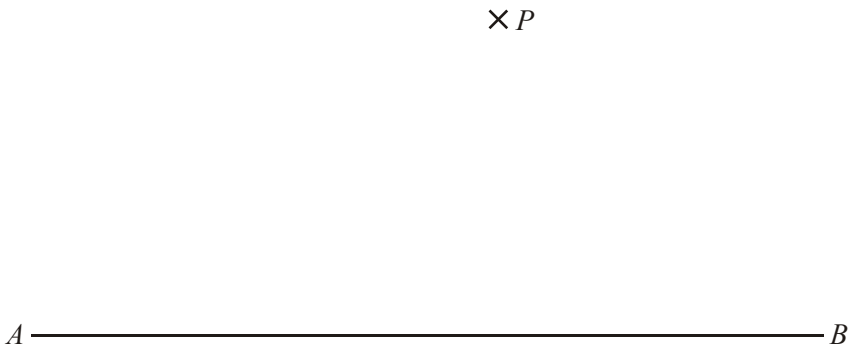
18.



Use ruler and compasses to **construct** the bisector of angle *ABC*.
You must show all construction lines.

(Total 2 marks)

19.



Use ruler and compass to construct the perpendicular from P to the line segment AB.
You must show **all** construction lines.

(Total 2 marks)

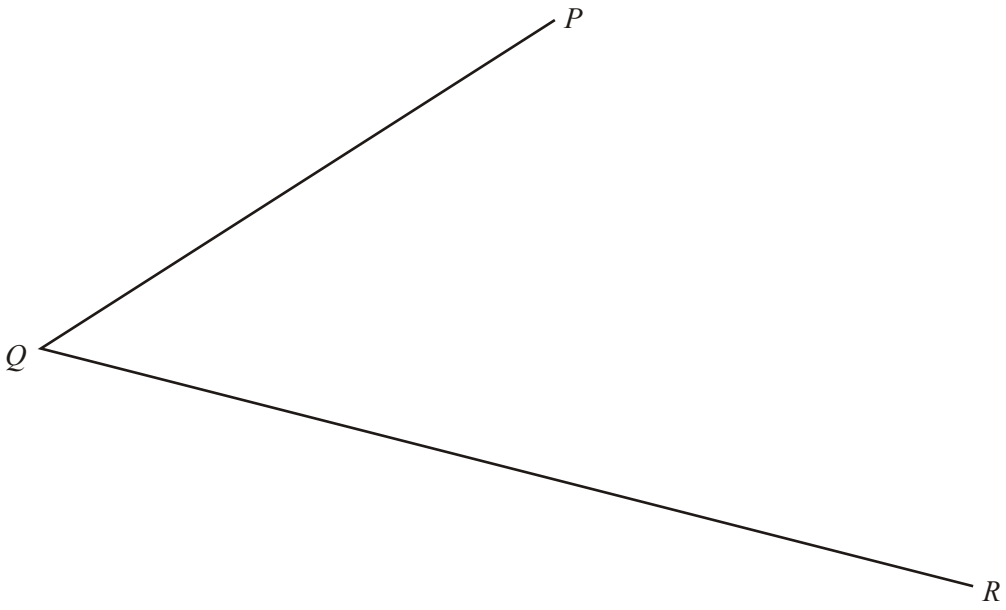
20. The diagram shows the positions of two ships, *A* and *B*.

A ship *C* is on a bearing of 064° from ship *A*.
Ship *C* is also on a bearing of 290° from ship *B*.

In the space above, draw an accurate diagram to show the position of ship *C*.
Mark the position of ship *C* with a cross ✕. Label it *C*.

(Total 3 marks)

21.



Use a ruler and compass to **construct** a bisector of angle *PQR*.
You must show all construction lines.

(Total 2 marks)

22.

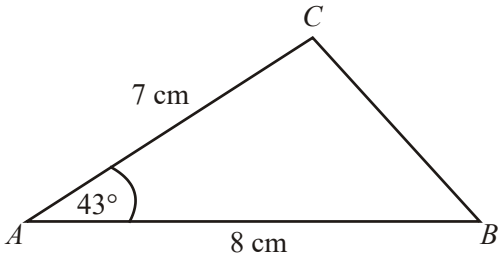


Diagram **NOT** accurately drawn

ABC is a triangle.
AB = 8 cm.
AC = 1 cm.
Angle *A* = 43°.

In the space below, make an accurate drawing of triangle *ABC*.
AB has been drawn for you.

A *B*

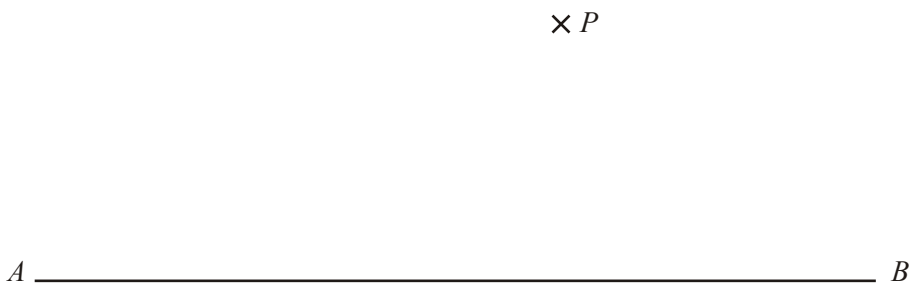
(Total 2 marks)

23.

Use ruler and compasses to **construct** the perpendicular bisector of the line segment PQ.
You must show all your construction lines.

(Total 2 marks)

24.



Use ruler and compasses to **construct** a line from the point *P* perpendicular to the line *AB*.
You must show all your construction lines.

(Total 2 marks)

25. Use ruler and compasses to construct the perpendicular bisector of the line *PQ*.
You must show all your construction lines.

P *Q*

(Total 2 marks)

26. The diagram shows a sketch of a solid shape.
The solid shape is made from six centimetre cubes.

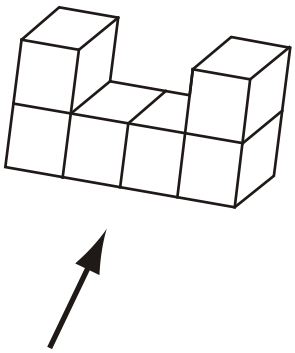
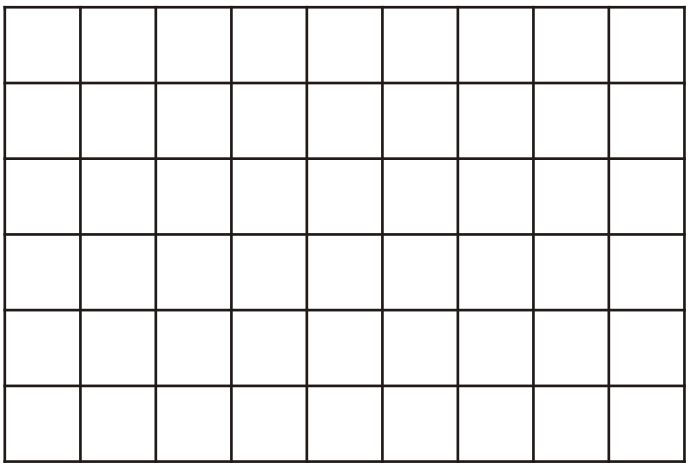


Diagram **NOT** accurately drawn

On the grid of centimetre squares, draw the front elevation of the solid shape from the direction marked with the arrow.



(Total 2 marks)

27. Use ruler and compasses to **construct** an angle of 45° at A.
You must show **all** construction lines.

(Total 3 marks)

1. Perpendicular from P to intersecting arcs (within tramlines); perpendicular at least 2 cm long 2

M1 relevant pair of arcs crossing within tramlines
A1
SC M1A0 for full construction of a line perpendicular to AB not through P

[2]

2. (a) Correct plane 2

B2 for a correct plane defined by showing at least 2 lines.
(B1 for a line of symmetry on one face)

(b) Correct net 2

B2 cao
(B1 for 2 equilateral triangles joined appropriately to at least one rectangle or for 1 equilateral triangle joined appropriately to one of 3 rectangles)

(c) Correct drawing 2

B1 for two extra sides of length 6cm (± 2mm)
B1 for construction arcs 6cm from each of the ends of the given line.

[6]

3. (a) Overlay (a) 2

B2 for correct triangle with arcs
(B1 for correct triangle, no arcs)

(b) Overlay (b) 2

M1 for 2 pairs of correct intersecting arcs
A1 for correct perpendicular bisector
SC If no marks B1 for line within guidelines

[4]

4. Correct trapezium 3

B1 for accurately placed D
B1 for accurately placed C
B1 for two pairs of arcs at D and C, centred on base vertices

[3]

5. (a) perp bisector 2

B1 appropriate arcs
B1 if within guidelines

(b) Angle bisector 2

B1 appropriate arcs
B1 if within guidelines

[4]

6. (a)

Elevation 2

B2 for 4 vertical squares. Accept 4 by 1 rectangle.
(B1 for 4 vertical squares with one square added or one parallelogram added at the top, or 3 vertical squares, or 4 horizontal squares)

(b)

Plan 2

B2 for 2 adjacent squares, vertical or horizontal. Accept 2 by 1 rectangle.
(B1 for 3 adjacent horizontal or vertical squares or a rectangle with sides in the ratio 2:1)

[4]

7. Line 2

B2 line fully within tramlines, crossing AB and CD

(B1 a straight line which crosses AB within the tramline, and also crosses CD)

NB: Accept dotted or dashed lines, but not curves; accept freehand if considered to be straight.

SC B1 for a perpendicular bisector of AB that is at least half way from AB to CD within the tramlines

[2]

8. 2

M1 for a relevant pair of intersecting arcs

A1 for line drawn within guidelines, at least 3cm in length, accept broken line

[SC: B1 for line drawn within guidelines if M0]

[2]

9. (a) Line 2

B2 line fully within tramlines, crossing AB and CD

(B1 a straight line which crosses AB within the tramline, and also crosses CD)

NB: Accept dotted or dashed lines, but not curves; accept freehand if considered to be straight.

SC B1 for the perpendicular bisector of AB reaching halfway or more from AB

(b) Region 2

B2 correct arc ±2mm and shaded within. Allow dotty or continuous arc.

(B1 inaccurate arc and shaded or accurate arc unshaded)

[4]

10. (a) $8 \times 5 = 40$ km 1

B1 accept answers from 39 to 41

(b) 023º – 027 1

B1 accept answers from 23º to 27º

(c) D correct 2

B2 cao (B1 D either 4 cm ±2mm from A or on correct bearing from A, 115º ± 2º)

[4]

11. 3

M1 for arcs construction of 60°
M1 for arcs bisector of '60°' (not 90°)
A1 (dep on both M marks) for 30° within guidelines
Alternative
M1 for arc construction of 90°
M1 for arcs construction of 60° based on perpendicular
A1 (dep on both M marks) for 30° within guidelines

[3]

12. Correct construction 2

M1 for constructing intersecting arcs of equal radius.
A1 for a correct triangle, with appropriate arcs.
SC: B1 for a triangle drawn within guidelines if M0 scored.
NB: Guidelines allow for 2mm tolerance

[2]

13. 2

M1 for correct intersecting arcs
A1 for correct angle bisector
SC: if no marks, B1 for line within guidelines

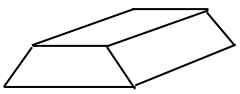
[2]

14. (a)

2

M1 rectangle with either correct width or height or any square
A1 cao

(b)



2

B2 for a correct sketch
(B1 any 3-D sketch of no more than 4 faces seen, with a trapezoidal face)

[4]

15. construction 2

M1 for a pair of arcs drawn from the same centre on 2 lines at same distance from meeting point; or a single arc crossing both lines; using an arc with a radius which is the length of the shorter line will imply an intersection with the end of that line. (± 2mm)
A1 for bisector (± 2°) and correct arcs
***SC: B1 for** bisector (± 2°) with no arcs, or incorrect arcs if M0 awarded.*
Accept bisectors that are dashed or dotted.

[2]

16. Within guidelines 3

See overlay

B1 for construction of 032 from Colwyn Bay
B1 for construction of 290 from Blackpool
*B1 for correct positioning **and** labelling of S*

[3]

17. Correct construction 2

M1 for relevent intersecting arcs aligned vertically
A1 for straight line within guidelines

[2]

18. Bisector 2

M1 pair of relevant arcs on line segments and corresponding relevant pair of intersecting arcs within guidelines
A1 bisector line within guidelines

[2]

19. perpendicular 2

M1 for intersecting arcs within guidelines, (exclude any at P)
A1 for line from P to AB within guidelines

[2]

20. 3

M1 correct angle of 064° ± 2°
M1 correct angle of 290° ± 2°
*A1 C at the intersection of their **drawn** bearings*

[3]

21. 2

M1 for pair of relevant arcs on line segments and corresponding relevant pair of intersecting arcs within guidelines
A1 for line drawn within guidelines

[2]

22. Overlay 2

B2 for a correct triangle
(B1 for correct angle A within guidelines , or for AC accurately drawn within guidelines)

[2]

23. perpendicular bisector 2

M1 for 2 valid pairs of intersecting arcs, within guidelines
A1 for perpendicular line

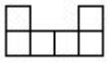
[2]

24. *M1 for relevant pair of intersecting arcs within guidelines not at P* 2
A1 for perpendicular line within guidelines
(SC:B1 for perpendicular line within guidelines with no arcs)

[2]

25. *M1 for two pairs of correct intersecting arcs* 2
A1 for correct perpendicular bisector
[SC if no marks , B1 for line within guidelines]

[2]

26.  2

B2 ignore orientation
(B1 for 1 square incorrect or missing or extra or an enlargement of the elevation)

[2]

27. Construct rt.angle at *A*
Bisect rt. Angle
Draw correct angle 3

B1 (indep) for correct construction of right angle (arcs needed)
B1 (indep) for correct method of bisecting right angle (arcs needed) or right angled isosceles triangle constructed
B1 (dep on one of previous B1) for 45° ± 2°
(SC(B1 after B0 awarded 45°with no arcs and 90°angle seen))

[3]

1. Mathematics A

Paper 3

The majority of candidates failed to achieve any marks on this question and a significant number did not even attempt it. Many of those who tried to draw a perpendicular through *P* drew two arcs which just touched at *P* and did not have two points of intersection. Some drew arcs of different radii (centred at *A* and *B*) which had presumably been added after the perpendicular had been drawn. A few candidates gained partial credit for constructing a perpendicular bisector of *AB*. This is a topic which centres are advised to spend more time on.

Paper 5

This construction question was by far the worst answered grade C question and was also answered badly by many of the higher grade candidates. It was very clear to examiners that many candidates had drawn in the perpendicular (presumably using protractors) before applying any 'construction' arcs.

Mathematics B Paper 16

Very poorly done indeed with only 6.2% of the candidature successfully constructing a perpendicular to the given point on the line. Many of the candidates who understood what they had to do, drew a line perpendicular to the given line and then offered a pair of intersecting arcs of various radii, usually in contradicting positions. Some candidates accurately constructed perpendiculars to the line through other points and gained one mark.

2. Specification A

Foundation Tier

(a) 55% of candidates were able to identify a line which went some way to define a plane of symmetry – however only 14% of candidates could fully define a plane by drawing at least two or the lines contained within it.
(b) This part of the question was successfully answered by 40% of candidates though nets often consisted of two triangles, one rectangle and two trapezia or parallelograms. The 16% of candidates that did this gained partial credit for their answers.
(c) 33% of candidates drew a triangle with sides of the correct length. However only 16% obtained the mark available for showing construction lines – i.e. arcs drawn using a pair of compasses.

Intermediate Tier

Most candidates gained at least one mark in part (a) but almost half drew only a line of symmetry, usually through the front triangular face or right-hand rectangular face. The triangular cross-section tended to be drawn most often by those scoring full marks.
Part (b) was well answered with three quarters of candidates gaining both marks. Most drew at least a rectangle with a triangle at each end but some then added two trapeziums rather than two more rectangles. A few candidates appeared not to know what a net is.
In part (c) the majority of candidates gained at least one mark. Many demonstrated a good understanding of construction and drew an accurate triangle with correct arcs. About 20%, though, measured the sides or used a protractor. These attempts were usually sufficiently accurate for one mark to be awarded.

Specification B

In part (a) drawing in one plane of symmetry did not always appear to have been previously experienced by the candidate in spite of this type of question making appearances on past papers. Just over 30% failed to score any marks on this question. The “plane” was often shown as a single line on a face and thus represented a line of symmetry rather than the plane.
The ‘net’ for the triangular prism was handled better with over 40% scoring both marks, but there were many variations on the theme not all of which were rewarded. The word ‘net’ seemed to be a mystery to several candidates resulting in the painstakingly drawing fishing nets to cover the shape.
The construction of the equilateral triangle produced many credit worthy attempts although the nature of the actual construction was somewhat lacking. To gain the full two marks it required the construction arcs to be shown but only 20% managed this approach.

3. Intermediate Tier

Part (a) was answered well with 60% of candidates using compasses correctly to construct the triangle. Some candidates, though, did not use compasses but measured the sides. These attempts were often sufficiently accurate for one mark to be awarded. Part (b) was answered less well with fewer that 25% of candidates constructing a perpendicular bisector correctly. Some drew a perpendicular bisector using only one pair of arcs and some without any arcs at all. Many candidates either drew a triangle or did not attempt this part of the question.

Higher Tier

Most candidates were able to score at least one mark for part (a), by drawing the correct triangle. Those who had remembered their compasses generally scored the two marks. Success rates on part (b) were generally lower. There were, of course, lots of correct constructions, but there were still substantial number of candidates who only drew a pair of intersecting arcs above the line and then joined the point of intersection to the (measured) midpoint of the line. There were several correct but non standard methods seen. These gained the two marks.

4. Most candidates made a good attempt to position points C and D in the correct place. The majority did so without construction, or failed to show their arcs clearly. Those who used construction arcs usually gained full marks.

5. Many candidates gave good answers to both parts, although part (b) was less convincing than part (a). There are still some candidates who think that the appropriate construction is the one with two arcs that kiss at the midpoint of the given line, with the perpendicular bisector squeezed in between them. This is not acceptable.

6. **Foundation Tier**

The demand for a side elevation in part (a) of this question attracted a better response than that for a plan in part (b). About half of the answers showed that the candidate understood what was required as a "side elevation" However a significant proportion either drew an elevation which was not from the direction shown or attempted a 3D drawing. The term "plan" was understood by very few candidates. Many produced a side elevation, a choice of views or an attempt at drawing a net.

Intermediate Tier

Part (a) was usually done well, with a few common errors such as drawing a side elevation or attempts to draw it as 3-D. IN contrast part (b) was not done well at all. Few understood what a plan was, and a lot tried to draw what looked like the net, or a side elevation.

7. Most candidates started their line from the centre of AB, which attracted the first mark. For the second mark the line had to be drawn perpendicular to AB, and few candidates were able to do this accurately. Though this was not a construction question, perpendicular constructions were usually accurate. Otherwise candidates demonstrated their misunderstanding of the question by merely joining their line to the midpoint of CD.

8. **Higher Tier**

Most candidates understood the terminology of the bisector of an angle and made a genuine attempt to do a construction. On the whole the question was well done with a lot of good accurate constructions. Candidates should be encouraged to show definite first arcs in their construction. A very common error was to construct the first arcs centred on the points P and R. It was evident that some candidates drew their "construction" lines after drawing the bisector line.

Intermediate Tier

This construction was generally attempted poorly if it was attempted at all. Of those who realised that an angle bisector must lie within the lines and *QR*, many who did have compasses drew arcs from *P* and *R* and then connected the intersection of these arcs to *Q*. Others drew a bisector (measured with a protractor?) and sometimes put in hand-drawn arcs on their line. Many constructed incorrect arcs around the diagram and connected them. Some merely joined *P* to *R* to complete the triangle.

9. The first part of this question led to many intriguing, if not bizarre solutions. Many candidates of course got full marks by drawing or constructing the perpendicular bisector of the line *AB* and extending this line to cut *CD.* Some candidates felt that they had to join the midpoints of *AB* and *CD*. Others drew a line which was equidistant from the lines *AB* and *DC*. Some candidates scored a mark by drawing the perpendicular bisector of *AB*, the perpendicular bisector of *CD* and extending them until they intersected.

Part (b) was very well answered.

10. Part (a) was well answered, but in part (b) candidates were unsure as to where the angle should be measured from. Some measured CAB, and some ACB. In part (c) it was again the angle that proved the problem, since many candidates correctly plotted the point at the correct distance from A, but angles varied wildly.

11. This question was not done well. A significant number of candidates used a protractor to draw an angle of 30° than either drew inappropriate arcs by hand and/or compasses or simply moved on to the next question. Partially incorrect answers include: constructing a perpendicular at P and then bisecting 90°, and using a protractor to draw an angle of 60° at P and then bisecting this with compasses.

12. **Foundation**

Most candidates attempted this question and many gained at least one mark for drawing a triangle within the required tolerance. This was often achieved by drawing the perpendicular bisector of the base (by sight rather than construction) and then measuring 6 cm from each end of the base or by measuring 60° angles. Less than half of the triangles within tolerance were drawn using compasses. Those candidates who did use compasses to do a correct construction usually gained both marks.

Higher

This question was generally done with most candidates showing their construction arcs and drawing an accurate triangle. Some constructed a 60° angle at both ends of the line. Candidates should be advised to draw their construction lines clearly. A small but significant number of candidates constructed the perpendicular bisector of the line and apparently used a protractor to complete the triangle. Those candidates not showing construction arcs were still able to score 1 mark for an accurate triangle within tolerance.

13. Foundation

Badly done. Only one in ten of candidates were able to draw a bisector. Construction lines were rarely seen. 5% of candidates gained both marks for constructing a bisector with reasonable accuracy. A further 5% gained 1 mark for drawing a bisector without construction lines but within an acceptable tolerance.

Higher

There was little evidence of candidates not having the appropriate equipment to carry out this construction; however correct use of compasses was not seen often enough. Many candidates used the ends of the arms of the angle as centres for their constructed intersecting arcs and thus failed to construct a bisector. Some candidates measured the angle and drew a bisector. If this was within tolerance, one mark was awarded.

14. Specification A

Foundation

The understanding of this topic is mixed. Clearly many candidates are confused with the terminology of side/front elevation and plan in part (a), very many simply copying one of the two elevations shown.

In part (b), attempts at a 3-D sketch were generally good and many candidates scored at least one mark in this part.

Higher

The correct answer of a 2 by 2 square was drawn by about half of the candidates. A very common error was to draw a rectangle with either the correct width or the correct height. Some candidates reproduced the given plan whilst others reproduced the given front elevation.

Part (b) was answered quite successfully. Most candidates seemed to have a good understanding of what was required and appreciated that the shape should look like a prism. Some of the sketches were not too well drawn but the majority at least showed a trapezoidal face.

Specification B

Foundation

Many candidates were able to score at least 1 mark for this question.

In part (a), few candidates drew a 2 × 2 square for the side elevation of the solid shape, but many were able to score a mark for a drawing an acceptable rectangle. In part (b), Many candidates were able to score at least 1 mark for an acceptable sketch of the solid shape.

Some had difficulty in maintaining the same perspective throughout the whole sketch. Common incorrect answers here include sketches of triangular prisms, cubes, cuboids and nets.

Higher

There were many good answers to part (a) although some candidates thought the required elevation looked like the plan or like the front elevation.

Answers to part (b) were generally successful.

15. Specification A

Foundation

Many candidates did not attempt this part, and few earned marks. It was clear that many did not understand the term “bisect”. Some drew a line through the angle, but it was hardly a bisector. Some who had a compass started by drawing a pair of arcs, but then could not progress the solution.

Higher

Of the candidates scoring 2 marks, most did this with very neat and precise responses, showing clear construction lines, although a few candidates did use very faint or minimal arcs which were difficult to see. In general it appeared that most candidates knew that bisect meant split the angle in half, although some candidates were seen to construct perpendicular bisectors through the 2 lines and others created a triangle and produced a perpendicular bisector of the new line.

The candidates gaining 1 mark were equally split between those splitting the angle without construction lines and those who drew arcs on the original lines. Many candidates were thrown by the fact that the two arms of the given angle were of different lengths and they drew arcs from the ends of the lines.

Specification B

Most candidates knew what the term ’angle bisector’ meant but in many cases could not carry out the required construction. There were some cases where a candidates found the perpendicular bisector of the bottom arm of the angle or where the ends of the arm where joined and the midpoint of that line found to get the candidate’s angle bisector.

16. **Paper 8**

The last two questions on this paper proved the most inaccessible with few marks scored. Many attempted to find the position of S with a cross often being drawn well below Colwyn Bay. Most candidates marked their angle with a little dash at the end of their protractor rather than a straight line, which then made it difficult to find the intersection easily. Candidates are to be encouraged to show clearly all construction lines for their own benefit. Quite a few artistic ships were drawn!

Paper 9

This question provided a wide variety of responses. Many correct and complete diagrams were seen, however many candidates failed to score at all. Often a bearing of 058° was constructed instead of a bearing of 032° . The most surprising of all attempts was from the candidates who constructed accurate bearings and then failed to complete the intersection of their lines, often labelling S in the centre of a line joining the points found from their protractor measurements or labelling 2 points with the letter S.

17. Success in this question was very centre based. Candidates who had prepared for the examination found this question straightforward. Some candidates clearly did not have compasses. A number of candidates found the centre by measurement and then drew a straight line. A minority of candidates drew the locus of points around the line.

18. Correct answers tended to be very centre based. A common error was to use points A and C as centres to draw arcs. A few candidates used a dashed line, which should be discouraged.

19. Responses to this construction question were varied. Candidates should be made aware that HB pencils should be used in compasses and that all necessary arcs should be clearly shown. There were a number of arcs that were too short as to be almost the size of points.

20. Foundation Tier

The vast majority of the candidates did not understand the concept of bearings and that when drawing a bearing the angle should start from the North line. As a result over 66% of the candidates scored no marks for this question. Most candidates did put a cross somewhere in the answer space, generally above points *A* and *B* but it was rare to find a candidate scoring all 3 available marks. Many (27%) were able to draw one of the bearings accurately. Surprisingly, this was not always the accurate drawing of the 64° angle but often a 70° angle drawn anticlockwise from the North line at *B*. Most candidates did not draw in the bearing, merely putting a dot on the paper. As a result it was difficult for the candidate to find *C* accurately as they were not able to see the intersection of the two bearings. Many candidates drew a North line at *C* too, and not always as a vertical line! Only 2.5% of the candidates scored all 3 available marks for this question.

Intermediate Tier

Bearings are not done well, at this level; however just over half gained one mark for either one correct bearing drawn (usually 064°) or recognising that the position of C was at the intersection of the two bearings. Many candidates constructed an angle of 64° from a horizontal line through A rather than from the vertical north line. Far too often candidates failed to actually construct a bearing line, leaving dots to indicate evidence of *some* understanding of bearings.

21. Candidates either knew the correct way to construct an angle bisector or they didn't. A common error was to draw two arcs of different lengths centred at *P* and *R*.

22. Very many of the drawings were accurate within the accepted degrees of tolerance. Errors tended to centre around the accuracy of the angle of 43^{o} rather than the construction of a 7cm line. Typical errors resulted in the required angle being either 53^{o} or 47^{o} or in some cases an angle of 43^{o} drawn at the point *B*.

23. This question was well answered with approximately 75% of candidates constructing the perpendicular bisector of the given line correctly.

24. The majority of candidates were able to construct the perpendicular from P to *AB*. A few candidates drew the perpendicular bisector of the line *AB* instead. Too often the construction was attempted without using compasses.

25. This question was poorly answered; many candidates clearly not understanding the meaning of "perpendicular bisector". Often one pair of intersecting arcs was drawn above the line *PQ* and a perpendicular line *drawn* from their point of intersection, the midpoint of *PQ* being found by measuring. A significant number merely drew a line perpendicular to *PQ* and could score one mark if their line was within the acceptable tolerance.

26. This question was well understood with 73% of candidates obtaining full marks. The 25% of candidates who scored no marks often made copies were of the original diagram and frequently side elevations and plans were seen. When candidates made an error of one square or made an enlargement of the front elevation they were awarded one mark; this occurred in 2% of cases.

27. **Paper 3**

Fully correct constructions were rarely seen and very few candidates used a construction to draw a right angle. Some candidates measured a 90° angle and then bisected it but the ma ority either measured or drew a 45° angle or attempted incorrect constructions. Arcs were often added as an afterthought or even drawn freehand.

Paper 5

This question was very poorly attempted. Only 20% of candidates obtained full marks on this Grade C topic. Some candidates erased their working, some tried to manufacture arcs out of nowhere and a common error was to bisect the given line.