4.6 Measuring, Drawing and Constructing: 2-hour Pack

Calculators not allowed · about 120 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Can a triangle be drawn with sides 6 cm, 5 cm and 5 cm? Give a reason for your answer.

(2)

2 A walker is facing South and turns clockwise through 270°. In which direction is the walker now facing? Give the compass direction.

(2)

3 On a map, 1 cm represents 1 km. A road is 7 cm long on the map. Work out the real length of the road in kilometres.

(2)

4 A point P is always the same distance from two straight lines that cross at an angle of 20°. What does the locus of P look like, and what angle does it make with each line?

(3)

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5 A walker is facing North East and turns clockwise through 135°. In which direction is the walker now facing? Give the compass direction.

(2)

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6 Maya measures an angle with a protractor. One arm of the angle passes through the 80° mark and the other arm passes through the 126° mark on the same scale. Work out the size of the angle.

(2)

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7 A walker is facing South West and turns clockwise through 315°. In which direction is the walker now facing? Give the compass direction.

(2)

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8 A dog is tied to a post on a flat field by a rope 7 m long. Describe the shape of the region where the dog can go, and state its radius.

(2)

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9 An angle measures 131°. Is it acute, obtuse, right or reflex? Give the type, and write down the size of the reflex angle that goes with it.

(2)

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10 On a map, 1 cm represents 1 km. A road is 8.2 cm long on the map. Work out the real length of the road in kilometres.

(2)

11 Can a triangle be drawn with sides 3 cm, 4 cm and 7 cm? Give a reason for your answer.

(2)

12 Can a triangle be drawn with sides 6 cm, 10 cm and 9 cm? Give a reason for your answer.

(2)

13 A dog is tied to a post on a flat field by a rope 5 m long. Describe the shape of the region where the dog can go, and state its radius.

(2)

14 A walker is facing North and turns clockwise through 180°. In which direction is the walker now facing? Give the compass direction.

(2)

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15 Angle ABC = 43°. The line BD bisects angle ABC. Work out the size of angle ABD.

(2)

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16 Can a triangle be drawn with sides 11 cm, 12 cm and 17 cm? Give a reason for your answer.

(2)

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17 Maya measures an angle with a protractor. One arm of the angle passes through the 69° mark and the other arm passes through the 144° mark on the same scale. Work out the size of the angle.

(2)

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18 A plan of a room uses a scale of 1 : 20. The room is 4.2 m long in real life. How long is the room on the plan? Give your answer in centimetres.

(2)

---

19 On a map, 1 cm represents 0.5 km. A road is 3.5 cm long on the map. Work out the real length of the road in kilometres.

(2)

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20 Can a triangle be drawn with sides 8 cm, 11 cm and 9 cm? Give a reason for your answer.

(2)

21 On a map, 1 cm represents 0.01 km. A road is 2.8 cm long on the map. Work out the real length of the road in kilometres.

(2)

22 A walker is facing East and turns clockwise through 90°. In which direction is the walker now facing? Give the compass direction.

(2)

23 A walker is facing South East and turns clockwise through 135°. In which direction is the walker now facing? Give the compass direction.

(2)

24 A walker is facing South East and turns clockwise through 45°. In which direction is the walker now facing? Give the compass direction.

(2)

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25 On a map, 1 cm represents 0.1 km. A road is 7 cm long on the map. Work out the real length of the road in kilometres.

(2)

---

26 An angle measures 57°. Is it acute, obtuse, right or reflex? Give the type, and write down the size of the reflex angle that goes with it.

(2)

---

27 Angle ABC = 79°. The line BD bisects angle ABC. Work out the size of angle ABD.

(2)

---

28 Can a triangle be drawn with sides 8 cm, 6 cm and 16 cm? Give a reason for your answer.

(2)

---

29 Can a triangle be drawn with sides 9 cm, 5 cm and 6 cm? Give a reason for your answer.

(2)

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30 A circle has centre O and radius 4 cm. Construct the chord AB with length 6 cm. Work out the distance from O to the chord AB.

(3)

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31 Angle XOY measures 150 degrees. It is bisected, and then the resulting angle is bisected again. Work out the size of the final angle produced.

(2)

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32 A circle has centre O and diameter 18 cm. A point P lies on the circle. Work out the distance OP.

(2)

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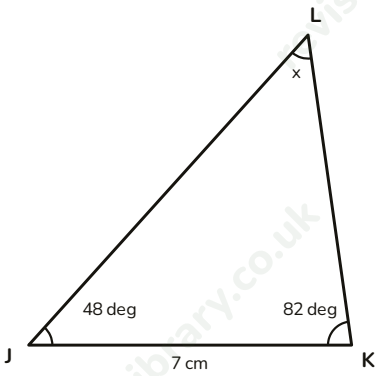
33 A line segment RS has length 30 cm. It is divided by its perpendicular bisector into two equal parts, and then one of those parts is itself bisected. Work out the length of the smallest part produced.

(2)

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34 Triangle JKL is constructed with JK = 7 cm, angle J = 48 degrees and angle K = 82 degrees, using ruler and protractor. Work out angle L.

Diagram NOT accurately drawn

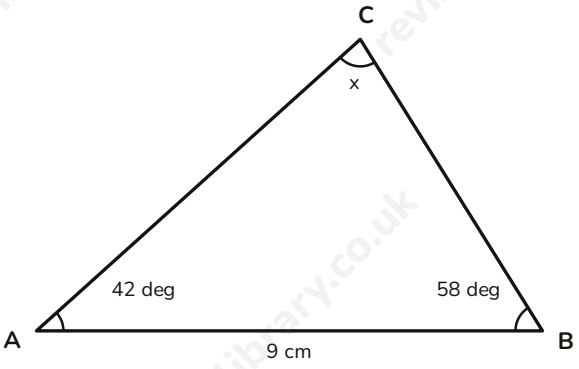


(2)

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35 A student constructs triangle ABC with AB = 9 cm, angle A = 42 degrees and angle B = 58 degrees, using a ruler and protractor. Work out angle C, then state which construction method (SSS, SAS or ASA) was used.

Diagram NOT accurately drawn



(3)

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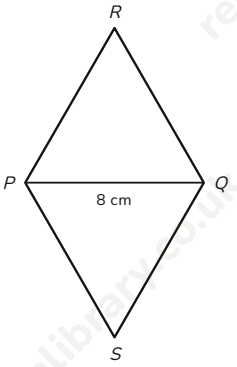
36 A student constructs the perpendicular bisector of segment MN. The endpoints are M(2, 3) and N(10, 9). Work out the coordinates of the midpoint of MN, and the length of MN.

(3)

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37 Using compasses, an equilateral triangle PQR with side length 8 cm is constructed. A second point S is added so that triangle PQS is also equilateral with side length 8 cm, sharing side PQ, on the opposite side of PQ from R. Work out the size of angle RPS.

Diagram NOT accurately drawn



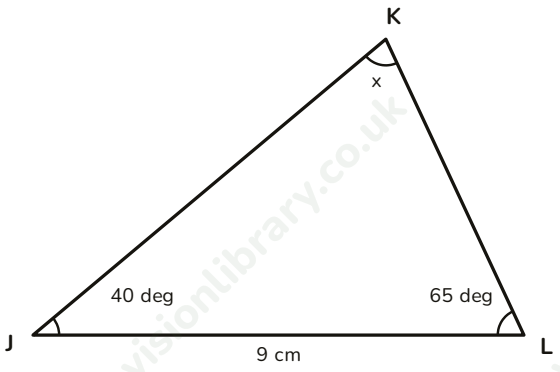
angle RPS = x

(3)

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38 Triangle JKL is constructed given JL = 9 cm, angle J = 40 degrees and angle L = 65 degrees. Work out angle K, and name which side of the triangle is the longest (in terms of two vertices).

Diagram NOT accurately drawn

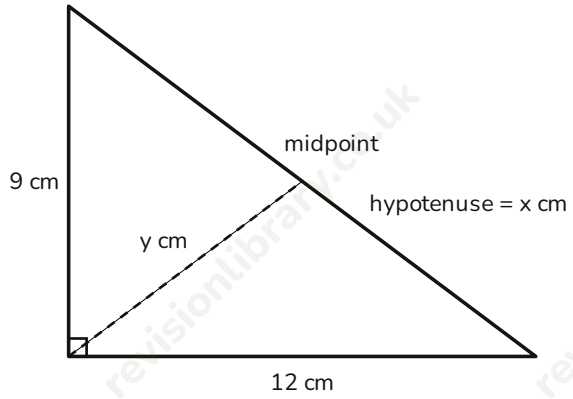


(3)

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39 Stretch question. A right-angled triangle is constructed with legs 9 cm and 12 cm meeting at a right angle. Work out the length of the hypotenuse. The perpendicular bisector of the hypotenuse is then constructed; using the fact that this point is equally distant from all three vertices, state the distance from the midpoint of the hypotenuse to each of the three vertices.

Diagram NOT accurately drawn



(4)

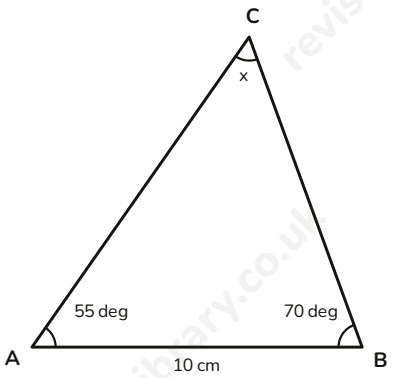
40 A circle has centre O and radius 6 cm. A point P lies on the circle. State the distance OP.

(1)

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41 A triangle is to be constructed with AB = 10 cm, angle A = 55 degrees and angle B = 70 degrees, using a ruler and protractor. Work out the size of angle C.

Diagram NOT accurately drawn



(2)

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42 Triangle DEF has sides DE = 5 cm, EF = 8 cm and DF = 10 cm. State which construction method (SSS, SAS or ASA) is appropriate, and state the compass radius needed to draw the arc from point D marking side DF.

(2)

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43 Line segment PQ has length 20 cm. State the length of each half after its perpendicular bisector is constructed.

(1)

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Mark scheme · 4.6 Measuring, Drawing and Constructing: 2-hour Pack

Question 1

adds the two shorter sides and compares with the longest	M1
Yes, with the correct comparison	A1

Answer: **Yes**

Question 2

180 + 270 = 450 (mod 360)	M1
East cao	A1

Answer: **East**

Question 3

7 x 1	M1
7 km cao	A1

Answer: **7 km**

Question 4

two perpendicular angle bisectors	B1
halves the angles between the lines: 20/2 and (180 - 20)/2	M1
the two bisectors make angles of 10° and 80° respectively with each original line	A1

Answer: **Two perpendicular angle bisectors, making angles of 10° and 80° respectively with each original line**

Question 5

45 + 135 = 180 (mod 360)	M1
South cao	A1

Answer: **South**

Question 6

126 - 80	M1
46° cao	A1

Answer: **46°**

Question 7

225 + 315 = 540 (mod 360)	M1
South cao	A1

Answer: **South**

Question 8

circle	B1
radius 7 m	B1

Answer: **A circle (or the inside of a circle) with radius 7 m**

Question 9

obtuse	B1
229°	B1

Answer: **obtuse; 229°**

Question 10

8.2 x 1	M1
8.2 km cao	A1

Answer: **8.2 km**

Question 11

adds the two shorter sides and compares with the longest	M1
No, with the correct comparison	A1

Answer: **No**

Question 12

adds the two shorter sides and compares with the longest	M1
Yes, with the correct comparison	A1

Answer: **Yes**

Question 13

circle	B1
radius 5 m	B1

Answer: **A circle (or the inside of a circle) with radius 5 m**

Question 14

0 + 180 (mod 360)	M1
South cao	A1

Answer: **South**

Question 15

43 ÷ 2	M1
21.5° cao	A1

Answer: **21.5°**

Question 16

adds the two shorter sides and compares with the longest	M1
Yes, with the correct comparison	A1

Answer: **Yes**

Question 17

144 - 69	M1
75° cao	A1

Answer: **75°**

Question 18

4.2 x 100 = 420 cm, then ÷ 20	M1
21 cm cao	A1

Answer: **21 cm**

Question 19

3.5 x 0.5	M1
1.75 km cao	A1

Answer: **1.75 km**

Question 20

adds the two shorter sides and compares with the longest	M1
Yes, with the correct comparison	A1

Answer: **Yes**

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Question 21

2.8 x 0.01	**M1**
0.028 km cao	**A1**

Answer: **0.028 km**

Question 22

90 + 90 = 180 (mod 360)	**M1**
South cao	**A1**

Answer: **South**

Question 23

135 + 135 = 270 (mod 360)	**M1**
West cao	**A1**

Answer: **West**

Question 24

135 + 45 = 180 (mod 360)	**M1**
South cao	**A1**

Answer: **South**

Question 25

7 x 0.1	**M1**
0.7 km cao	**A1**

Answer: **0.7 km**

Question 26

acute	**B1**
303°	**B1**

Answer: **acute; 303°**

Question 27

79 ÷ 2	**M1**
39.5° cao	**A1**

Answer: **39.5°**

Question 28

adds the two shorter sides and compares with the longest	**M1**
No, with the correct comparison	**A1**

Answer: **No**

Question 29

adds the two shorter sides and compares with the longest	**M1**
Yes, with the correct comparison	**A1**

Answer: **Yes**

Question 30

recognises perpendicular from centre bisects chord so half chord = 3 cm and uses right triangle with hypotenuse 4 and one side 3	**M1**
uses Pythagoras to find distance: $d^2 + 3^2 = 4^2$	**M1**
$d = \sqrt{7}$ cm approximately 2.65 cm cao	**A1**

Answer: **$\sqrt{7}$ cm**

Question 31

first bisection: 150 / 2 = 75 degrees	**M1**
second bisection: 37.5 degrees cao	**A1**

Answer: **37.5 degrees**

Question 32

uses radius = diameter / 2	**M1**
9 cm cao	**A1**

Answer: **9 cm**

Question 33

first bisection: 30 / 2 = 15 cm	**M1**
second bisection: 7.5 cm cao	**A1**

Answer: **7.5 cm**

Question 34

uses angle sum of a triangle = 180	**M1**
50 degrees cao	**A1**

Answer: **50 degrees**

Question 35

uses angle sum of a triangle = 180	**M1**
angle C = 80 degrees cao	**A1**
ASA (angle-side-angle)	**B1**

Answer: **Angle C = 80 degrees; method ASA**

Question 36

uses midpoint = ((2+10)/2, (3+9)/2) = (6, 6)	**M1**
uses length = $\sqrt{(10-2)^2 + (9-3)^2}$	**M1**
length = 10 cao	**A1**

Answer: **Midpoint (6, 6); length 10**

Question 37

recognises each equilateral triangle has a 60 degree angle at P	**M1**
adds the two 60 degree angles at P across the shared vertex	**M1**
120 degrees cao	**A1**

Answer: **120 degrees**

Question 38

uses angle sum of a triangle = 180	**M1**
angle K = 75 degrees cao	**A1**
longest side is JL (opposite the largest angle, K)	**B1**

Answer: **Angle K = 75 degrees; longest side JL**

Question 39

uses Pythagoras' theorem: $\text{hypotenuse}^2 = 9^2 + 12^2$	**M1**
$9^2 + 12^2 = 81 + 144 = 225$	**M1**
hypotenuse = 15 cm cao	**A1**
distance to each vertex = 7.5 cm cao	**A1**

Answer: **Hypotenuse 15 cm; distance to each vertex 7.5 cm**

Question 40

6 cm cao	**B1**

Answer: **6 cm**

Question 41

uses angle sum of a triangle = 180	**M1**
55 degrees cao	**A1**

Answer: **55 degrees**

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Question 42

SSS (side-side-side)	**B1**
radius = 10 cm cao	**B1**

Answer: **SSS; radius 10 cm**

Question 43

10 cm cao	**B1**

Answer: **10 cm**

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