KS3.M-G19 Bearings and Scale

AQA KS3.M-G19 · Calculators not allowed · about 60 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Give the three-figure bearing of the direction shown: from point X to point Y is directly east.

(1)

2 Give the three-figure bearing of the direction shown: from A to B is directly south.

(1)

3 Write down the bearing from P to Q if Q is 45 degrees clockwise from north of P.

(2)

4 A ship sails from port M on a bearing of 215. What is the bearing back from the ship to port M?

(2)

5 A plane flies from airport S to airport T on a bearing of 072. Another plane flies from T to U on a bearing of 242. Are these two bearings reciprocals? Explain briefly.

(2)

6 On a map, road R goes from village V to town T. The bearing from V to T is 328. A cyclist at V rides on a bearing of 050 for a while. Calculate the smaller angle between the cyclist's direction and the direction to T from V.

(3)

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7 A bearing is given as 306. What is the bearing measured anti-clockwise from north to the same direction? Give your answer as a three-figure bearing.

(2)

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8 On a scale drawing 1 cm represents 500 m. Calculate the drawing length in centimetres for a real distance of 2.5 km.

(2)

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9 A map uses scale 1:40 000. A straight road measures 7.5 cm on the map. Work out the real distance in kilometres.

(3)

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10 A sketch map shows two towns A and B. On the map, the bearing from A to B is 270 and the map distance is 4 cm. The scale is 1 cm to 2 km. Give the real compass direction from B back to A and the real distance in km.

(2)

11 A surveyor draws a plan with scale 1:250. A garden measures 6 m by 4 m in reality. What are the dimensions on the plan in centimetres? Give answers to 1 decimal place if needed.

(2)

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12 A student measures the bearing from X to Y as 215 on a sketch. The protractor reading might be 214, 215 or 216 due to small error. State the bearing to the nearest degree and explain whether this uncertainty affects the three-figure bearing.

(2)

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13 On a map with scale 1:100 000, two landmarks are 2.2 km apart in reality. Find the distance between them on the map in centimetres. Show the conversion steps.

(3)

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14 A ship at sea is at bearing 157 from lighthouse L. Another ship is at bearing 070 from the same lighthouse. Calculate the acute angle between the two ships as seen from the lighthouse.

(2)

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15 A town P is due north of town Q. A car drives from Q on a bearing of 035 and another car drives from Q on a bearing of 130. Which car is closer in direction to P? Justify your answer with a calculation.

(2)

16 A map shows three villages X, Y and Z. The bearing from X to Y is 112 and the bearing from X to Z is 284. Work out the size of the angle YXZ (angle at X between lines to Y and Z). State whether it is reflex or acute, giving reasoning.

(2)

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17 A scale drawing uses scale 1:5000. A river runs in a straight line on the drawing from point R to point S measuring 14.6 cm. A bridge is built 1.8 km downstream from S along the same river. Calculate the position of the bridge on the drawing in centimetres measured from R. Show your working clearly.

(4)

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18 A coastal surveyor stands at point T and measures bearings to four buoys: A 045, B 140, C 225 and D 320. On a large map she plots T at the centre and draws lines at these bearings. She needs to label the clockwise order of buoys starting from the smallest bearing. Give the order and explain whether any two adjacent buoys are less than 90 degrees apart.

(3)

Mark scheme · KS3.M-G19 Bearings and Scale

Question 1

- **B1** 090 cao
- Answer: **090**

Question 2

- **B1** 180 cao
- Answer: **180**

Question 3

- **M1** understands bearing measured clockwise from north and calculates 0 + 45 = 045
- **A1** 045 cao
- Answer: **045**

Question 4

- **M1** adds or subtracts 180 degrees to find opposite direction: 215 - 180 = 35 or 215 + 180 = 395 then convert
- **A1** 035 cao
- Answer: **035**

Question 5

- **M1** shows method: adds or subtracts 180 to 072 gives 252 (or 072+180=252) or compares 242
- **A1** statement that they are not reciprocals because reciprocal of 072 is 252, not 242
- Answer: **No; reciprocal of 072 is 252, not 242**

Question 6

- **M1** method to find difference using clockwise bearings: 050 - 328 or add 360 then subtract gives 82
- **M1** identifies need to take smaller angle (82 is less than 278) oe
- **A1** 82 degrees cao
- Answer: **82 degrees**

Question 7

- **M1** understands anti-clockwise is reverse direction: compute 360 - 306 = 54
- **A1** 054 cao
- Answer: **054**

Question 8

- **M1** converts 2.5 km to metres 2500 m and divides by 500 to find 5 cm or uses ratio 2.5/0.5
- **A1** 5 cm cao
- Answer: **5 cm**

Question 9

- **M1** converts map cm to real cm: 7.5 x 40 000 = 300 000 cm or uses 7.5 x 400 = 3000 m
- **M1** converts cm to metres then to km correctly
- **A1** 3 km cao
- Answer: **3 km**

Question 10

- **M1** knows reciprocal bearing is 090 or 270 ± 180 = 090
- **A1** 090 and 8 km cao
- Answer: **090 and 8 km**

Question 11

- **M1** converts metres to cm and divides by 250: 600 cm/250 = 2.4 and 400 cm/250 = 1.6
- **A1** 2.4 cm by 1.6 cm cao
- Answer: **2.4 cm by 1.6 cm**

Question 12

- **M1** states nearest degree as 215
- **A1** explains three-figure bearing still 215 because rounding to nearest degree gives 215 and three figures include leading zero if needed
- Answer: **215; No change, the three-figure bearing is 215**

Question 13

- **M1** converts 2.2 km to cm: 2.2 x 1000 = 2200 m then x100 = 220 000 cm or directly 2.2 x 100 000 = 220 000 cm
- **M1** divides by scale 100 000 to get map cm: 220 000 / 100 000 = 2.2
- **A1** 2.2 cm cao
- Answer: **2.2 cm**

Question 14

- **M1** finds difference: 157 - 070 = 87 or 070 - 157 = -87 then takes absolute value
- **A1** 87 degrees cao
- Answer: **87 degrees**

Question 15

- **M1** computes differences from north (000): |035 - 000| = 35 and |130 - 000| = 130 or uses smallest angle to north
- **A1** car on 035 is closer to P because 35 degrees < 130 degrees
- Answer: **The car on 035; 35 degrees from north compared with 130 degrees**

Question 16

- **M1** finds difference using bearings: 284 - 112 = 172 or computes smaller angle 360 - 172 = 188 and chooses smaller (172)
- **A1** 172 degrees, an obtuse angle (not reflex) cao
- Answer: **172 degrees; obtuse (angle less than 180)**

Question 17

- **M1** converts 1.8 km to cm: 1.8 x 1000 = 1800 m then x100 = 180 000 cm
- **M1** divides by scale 5000 to get map cm for downstream distance: 180 000 / 5000 = 36
- **M1** adds this to distance RS on drawing: 14.6 + 36 = 50.6 cm
- **A1** 50.6 cm cao
- Answer: **50.6 cm**

Question 18

- **M1** lists bearings in ascending order: 045, 140, 225, 320
- **M1** gives clockwise order of buoys as A, B, C, D
- **A1** checks adjacent differences: 095, 085, 095, 085 and states that B and C are 85 degrees apart (less than 90) and T and D pairs are 95 degrees apart
- Answer: **Order: A, B, C, D. Adjacent differences: A-B 95 degrees, B-C 85 degrees (less than 90), C-D 95 degrees, D-A 85 degrees (less than 90 for D-A if going via 360)**