Year 9 Bearings and Transformations – Mixed Practice

ANSWER KEY HappyKids.fit

Answers and worked solutions · 30 questions

A. Mixed practice (mixed order)

1. 021°

The back bearing differs by 180°: 201 − 180 = 021°

2. 8 cm

2 km = 200 000 cm
200 000 ÷ 25 000 = 8 cm

3. (7, 6)

From A to B: x changes by 12, y by 12
One third: 4 and 4
P = (7, 6)

4. 3.75 km

Real distance = 7.5 × 50 000 = 375 000 cm
375 000 cm ÷ 100 000 = 3.75 km

5. 225°; opposite 045°

Bearings are measured clockwise from north
South-west = 225°
Opposite: 225 − 180 = 045°

6. (1, −4)

From A to B: x changes by −3, y by −9
One third: −1 and −3
P = (1, −4)

7. 22 m by 22 m

Multiply by 200: 11 × 200 = 2200 cm and 11 × 200 = 2200 cm
In metres: 22 m by 22 m

8. side 24 cm; perimeter 96 cm; area 576 cm^2

Original side √36 = 6 cm
Image side 4 × 6 = 24 cm, perimeter 4 × 24 = 96 cm
Area 24^2 = 576 cm^2 (× 16)

9. (−2, −4)

AP is 1/5 of AB
AB: x changes by 15, y by 10
1/5 of these: 3 and 2, so P = (−2, −4)

10. 189°

The back bearing differs by 180°: 9 + 180 = 189°

11. (–5, 0)

From A to B: x changes by 3, y by –9
One third: 1 and –3
P = (–5, 0)

12. 2.4 km

Real distance = 2.4 × 100 000 = 240 000 cm
240 000 cm ÷ 100 000 = 2.4 km

13. 122°; 7.3 km

Going back reverses the direction: 302 – 180 = 122°
The distance is the same: 7.3 km

14. (–8, 2)

AP is 3/8 of AB
AB: x changes by –16, y by –8
3/8 of these: –6 and –3, so P = (–8, 2)

15. perimeter 78 cm (3 times); area 378 cm^2 (9 times)

Image: 18 cm by 21 cm
Perimeter 26 → 78 cm (× 3)
Area 42 → 378 cm^2 (× 3^2 = 9)

16. Both length and width are multiplied by 2, so the area is multiplied by 2^2 = 4: 16 cm^2.

Error: the area scale factor is the square of the length scale factor
$2^2 = 4$
4 × 4 = 16 cm^2

17. 314°

The back bearing differs by 180°: 134 + 180 = 314°

18. (0, 1)

From A to M: x changes by 0, y by 2
Do the same again from M: B = (0, 1)

19. No. The enlargement changes every length, so the image is similar to S but not congruent.

Reflections, rotations and translations do not change lengths or angles
An enlargement multiplies lengths by the scale factor
Decide: not congruent (similar)

20. (2, 3)

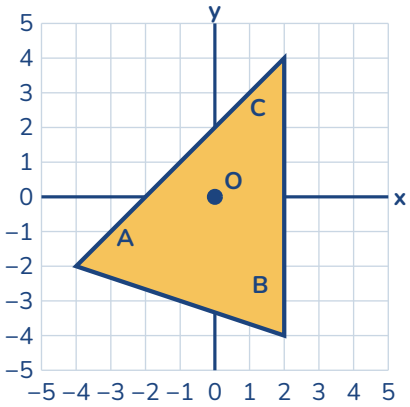
From A to B: x changes by –6, y by 3
One third: –2 and 1
P = (2, 3)

21. **A' (−4, −2), B' (2, −4), C' (2, 4)**

The centre is inside the triangle

Multiply the distance (across and up) from O to each corner by 2

A (−2, −1) → (−4, −2), B (1, −2) → (2, −4), C (1, 2) → (2, 4)



22. **(−9, 6)**

AP is 1/4 of AB

AB: x changes by −12, y by 4

1/4 of these: −3 and 1, so P = (−9, 6)

23. **Yes. Neither changes any length or angle, so the image is congruent.**

Try an example

Neither changes any length or angle, so the image is congruent.

Decide

24. **scale factor 5; width 20 cm**

Area scale factor = 700 ÷ 28 = 25

Length scale factor = √25 = 5

Width = 5 × 4 = 20 cm

25. **AP : PB = 1 : 3 means 4 parts, so P is 1/4 of the way from A: P = (−4, −2).**

Error: the ratio 1 : 3 has 1 + 3 = 4 parts, not 3

A quarter of (−12, 12) is (−3, 3)

P = (−4, −2)

26. **640 m**

6.4 × 10 000 = 64 000 cm

64 000 ÷ 100 = 640 m

27. **296°**

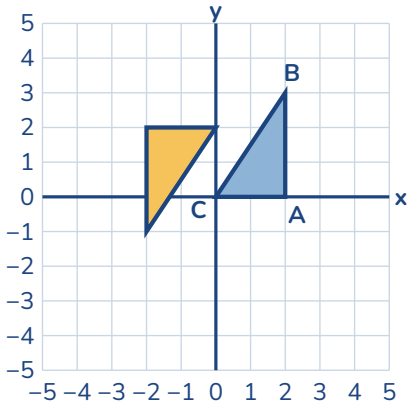
The back bearing differs by 180°: 116 + 180 = 296°

28. A" (−2, 2), B" (−2, −1), C" (0, 2)

First: A → (0, 2), B → (−3, 2), C → (0, 0)

Then: A" (−2, 2), B" (−2, −1), C" (0, 2)

The final image is congruent to ABC



29. a rotation of 90° anticlockwise about (0, −2)

(3, 0) → (−2, 1), (2, −3) → (1, 0), (0, 1) → (−3, −2)

Test how the coordinates change: a rotation of 90° anticlockwise about (0, −2)

Check: same shape and size (congruent)

30. 14 m by 24 m

Multiply by 200: 7 × 200 = 1400 cm and 12 × 200 = 2400 cm

In metres: 14 m by 24 m