nexamind EDUCATION

Name _____ Date _____

Stage 7 End-of-unit test 14 — mark scheme

22 questions · 47 marks · calculators are not allowed · allow about 45 minutes

1 In which quadrant is the point (−3, 5)? **[1]**

- ☐ quadrant 1
- ☐ quadrant 2
- ☐ quadrant 3
- ☐ quadrant 4

Answer: quadrant 2

x is negative and y is positive.

2 How far apart are the points (2, 7) and (9, 7)? **[2]**

Answer: 7

They share a y-coordinate, so the line is horizontal: 9 − 2 = 7.

3 How far apart are the points (−4, −3) and (−4, 6)? **[2]**

Answer: 9

They share an x-coordinate, so subtract the y-coordinates: 6 − (−3) = 9.

4 What is the midpoint of (−5, 2) and (7, 2)? **[2]**

Answer: (1, 2)

Across: −5 + 7 = 2, and 2 ÷ 2 = 1. The y stays at 2, so the midpoint is (1, 2).

5 A plan uses the scale 1 cm represents 4 m. A room is 7 cm long on the plan. How long is the real room, in metres? **[2]**

Answer: 28

7 × 4 = 28 m.

6 A map has scale 1 : 25 000. Two points are 6 cm apart on the map. How many kilometres apart are they? **[3]**

Answer: 1.5

6 × 25 000 = 150 000 cm, and 150 000 ÷ 100 000 = 1.5 km.

7 Translate the point (3, −2) by the vector (−5, 6). **[2]**

Answer: (−2, 4)

3 + (−5) = −2 and −2 + 6 = 4, giving (−2, 4).

8 A point moves from (1, 4) to (6, −1). Write the translation as (across, up). **[2]**

Answer: (5, −5)

6 − 1 = 5 across and −1 − 4 = −5 up.

9 After a translation, the image is ... **[1]**

- ☐ larger
- ☐ congruent to the object
- ☐ similar but not congruent
- ☐ a mirror image

Answer: congruent to the object
Only the position changes.

10 Reflect the point (4, 3) in the x-axis. **[2]**

Answer: (4, −3)
The x-axis is y = 0, so x stays and y changes sign: (4, −3).

11 Reflect the point (−2, 5) in the y-axis. **[2]**

Answer: (2, 5)
The y-axis is x = 0, so y stays and x changes sign: (2, 5).

12 A point at (6, 2) has an image at (6, −2). Name the mirror line. **[2]**

Answer: the x-axis
The x is unchanged and the y has changed sign.

13 A point lies on the mirror line. Where is its image? **[2]**

- ☐ On the other side
- ☐ In the same place
- ☐ At the origin
- ☐ It disappears

Answer: In the same place
Its distance from the mirror is 0, so it is invariant.

14 Rotate the point (3, 1) by 90° anticlockwise about the origin. **[2]**

Answer: (−1, 3)
(x, y) → (−y, x), so (3, 1) → (−1, 3).

15 Rotate the point (−4, 2) by 180° about the origin. **[2]**

Answer: (4, −2)
Both signs change: (4, −2).

16 Rotate the point (4, 2) by 90° anticlockwise about the centre (1, 1). **[3]**

Answer: (0, 4)
The point is 3 across and 1 up from the centre. A quarter turn anticlockwise sends that to 1 left and 3 up, so the image is (0, 4).

17 To describe a rotation fully you must give ... **[2]**

- ☐ the angle only
- ☐ the angle and the direction
- ☐ the angle, the direction and the centre
- ☐ the centre only

Answer: the angle, the direction and the centre
All three earn the marks.

18 Enlarge the point (3, 2) by scale factor 4, centre the origin. **[2]**

Answer: (12, 8)
3 × 4 = 12 and 2 × 4 = 8, giving (12, 8).

19 After an enlargement with scale factor 2, the image is ... **[2]**

- ☐ congruent to the object
- ☐ mathematically similar to the object
- ☐ a reflection of the object
- ☐ unchanged

Answer: mathematically similar to the object

Same shape, twice the size.

20 A rectangle is 3 cm by 5 cm. It is enlarged by scale factor 3. What is the area of the image, in square centimetres? **[4]**

Answer: 135

The image is $3 \times 3 = 9$ cm by $5 \times 3 = 15$ cm, so its area is $9 \times 15 = 135$ cm². The original area was $3 \times 5 = 15$ cm², and $15 \times 9 = 135$.

21 A shape has perimeter 18 cm. After an enlargement its perimeter is 54 cm. What was the scale factor? **[3]**

Answer: 3

A perimeter scales like a length: $54 \div 18 = 3$.

22 Which transformation does **not** give a congruent image? **[2]**

- ☐ translation
- ☐ reflection
- ☐ rotation
- ☐ enlargement

Answer: enlargement

The other three preserve size; an enlargement does not, unless the scale factor is 1.

Total: 47 marks