4.16 Transformations: Reflection and Rotation: 2-hour Pack

Calculators not allowed · about 120 minutes

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 The point P (4, 3) is rotated 180° clockwise about (-1, 0). Write down the coordinates of the image of P.

(3)

2 The point P (-2, 4) is rotated 180° clockwise about (-1, 0). Write down the coordinates of the image of P.

(3)

3 The points A (3, 3) and B (-4, -4) are reflected in the line y = -x. Write down the coordinates of the images A' and B'.

(2)

4 The point P (0, 4) is rotated 180° anticlockwise about (0, 1). Write down the coordinates of the image of P.

(3)

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5 The points A (-6, 5) and B (2, 2) are reflected in the line y = x. Write down the coordinates of the images A' and B'.

(2)

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6 The point P (-2, 2) is reflected in the x-axis and the image is then translated by 1 units to the right and 4 units up (negative means left or down). Write down the coordinates of the final image.

(3)

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7 A shape is transformed by a single transformation. Three of its points map as follows: (2, 5) to (-2, 5), (1, 5) to (-1, 5), (6, 4) to (-6, 4).
Describe fully the single transformation.

(2)

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8 The points A (-4, -6) and B (6, 0) are reflected in the line y = -x. Write down the coordinates of the images A' and B'.

(2)

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9 A shape is transformed by a single transformation. Three of its points map as follows: (3, 4) to (-3, -4), (6, 1) to (-6, -1), (2, 1) to (-2, -1).
Describe fully the single transformation.

(2)

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10 A shape is transformed by a single transformation. Three of its points map as follows: (5, 3) to (-5, 3), (4, 1) to (-4, 1), (1, 4) to (-1, 4).
Describe fully the single transformation.

(2)

11 The point P (1, 4) is reflected in the x-axis and the image is then translated by -4 units to the right and -1 units up (negative means left or down). Write down the coordinates of the final image.

(3)

12 The point P (5, 1) is reflected in the y-axis and the image is then translated by -3 units to the right and 1 units up (negative means left or down). Write down the coordinates of the final image.

(3)

13 A shape is transformed by a single transformation. Three of its points map as follows: (1, 4) to (-1, -4), (3, 4) to (-3, -4), (6, 3) to (-6, -3).
Describe fully the single transformation.

(2)

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14 The points A (-6, -5) and B (2, -2) are reflected in the line y = x. Write down the coordinates of the images A' and B'.

(2)

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15 The point P (-1, 5) is reflected in the x-axis and the image is then translated by -3 units to the right and -4 units up (negative means left or down). Write down the coordinates of the final image.

(3)

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16 The point P (1, -2) is reflected in the y-axis and the image is then translated by 0 units to the right and 3 units up (negative means left or down). Write down the coordinates of the final image.

(3)

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17 The points A (-3, 5) and B (-6, 0) are reflected in the line y = -x. Write down the coordinates of the images A' and B'.

(2)

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18 The point P (-2, 1) is rotated 270° anticlockwise about (1, 2). Write down the coordinates of the image of P.

(3)

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19 The point P (-1, 4) is reflected in the x-axis and the image is then translated by -1 units to the right and 4 units up (negative means left or down). Write down the coordinates of the final image.

(3)

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20 The point P (-3, -5) is reflected in the y-axis and the image is then translated by -3 units to the right and -2 units up (negative means left or down). Write down the coordinates of the final image.

(3)

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21 A shape is transformed by a single transformation. Three of its points map as follows: (2, 1) to (2, -1), (1, 4) to (1, -4), (4, 2) to (4, -2).
Describe fully the single transformation.

(2)

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22 The points A (6, 6) and B (-1, -2) are reflected in the line y = x. Write down the coordinates of the images A' and B'.

(2)

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23 The point P (1, 1) is rotated 270° clockwise about (0, 2). Write down the coordinates of the image of P.

(3)

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24 The point P (5, -4) is rotated 180° anticlockwise about (-1, 0). Write down the coordinates of the image of P.

(3)

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25 The point P (-3, 5) is rotated 180° clockwise about (1, 0). Write down the coordinates of the image of P.

(3)

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26 A shape is transformed by a single transformation. Three of its points map as follows: (4, 2) to (-4, -2), (2, 4) to (-2, -4), (1, 3) to (-1, -3).
Describe fully the single transformation.

(2)

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27 The point P (1, 2) is rotated 180° clockwise about (-1, 1). Write down the coordinates of the image of P.

(3)

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28 A shape is transformed by a single transformation. Three of its points map as follows: (4, 2) to (2, -4), (5, 4) to (4, -5), (3, 4) to (4, -3).
Describe fully the single transformation.

(2)

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29 A shape is transformed by a single transformation. Three of its points map as follows: (2, 4) to (4, 2), (3, 1) to (1, 3), (3, 5) to (5, 3).
Describe fully the single transformation.

(2)

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30 The point P (-2, 3) is rotated 270° clockwise about (2, 0). Write down the coordinates of the image of P.

(3)

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31 The point P (-3, 4) is reflected in the y-axis and the image is then translated by 3 units to the right and 2 units up (negative means left or down). Write down the coordinates of the final image.

(3)

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32 The point P (-5, -2) is rotated 90° clockwise about (2, 2). Write down the coordinates of the image of P.

(3)

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33 The point P (-2, -3) is rotated 270° anticlockwise about (2, -1). Write down the coordinates of the image of P.

(3)

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34 Reflect the point H(-4, -3) in the line x = -1. Give the coordinates of the image H'.

(2)

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35 Stretch question. The right-angled triangle with vertices X(2, 1), Y(6, 1) and Z(2, 4) is first rotated 90 degrees anticlockwise about the point X(2, 1), then reflected in the line y = 0. Give the coordinates of X', Y' and Z' after both transformations.

(4)

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36 Point D is at (-5, 2). Reflect D in the line x = 0 then in the line y = 0. Write the final coordinates.

(1)

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37 Rotate point F(0, -4) 180 degrees about the origin. Give the coordinates of the image.

(2)

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Mark scheme · 4.16 Transformations: Reflection and Rotation: 2-hour Pack

Question 1

vector from the centre to P found	M1
rotated correctly	M1
(-6, -3) cao	A1

Answer: **(-6, -3)**

Question 2

vector from the centre to P found	M1
rotated correctly	M1
(0, -4) cao	A1

Answer: **(0, -4)**

Question 3

A' = (-3, -3)	B1
B' = (4, 4)	B1

Answer: **(-3, -3), (4, 4)**

Question 4

vector from the centre to P found	M1
rotated correctly	M1
(0, -2) cao	A1

Answer: **(0, -2)**

Question 5

A' = (5, -6)	B1
B' = (2, 2)	B1

Answer: **(5, -6), (2, 2)**

Question 6

reflection carried out	M1
intermediate image (-2, -2)	A1
(-1, 2) cao	A1

Answer: **(-1, 2)**

Question 7

correct type of transformation identified	M1
reflection in the y-axis cao	A1

Answer: **reflection in the y-axis**

Question 8

A' = (6, 4)	B1
B' = (0, -6)	B1

Answer: **(6, 4), (0, -6)**

Question 9

correct type of transformation identified	M1
rotation of 180 degrees about the origin cao	A1

Answer: **rotation of 180 degrees about the origin**

Question 10

correct type of transformation identified	M1
reflection in the y-axis cao	A1

Answer: **reflection in the y-axis**

Question 11

reflection carried out	M1
intermediate image (1, -4)	A1
(-3, -5) cao	A1

Answer: **(-3, -5)**

Question 12

reflection carried out	M1
intermediate image (-5, 1)	A1
(-8, 2) cao	A1

Answer: **(-8, 2)**

Question 13

correct type of transformation identified	M1
rotation of 180 degrees about the origin cao	A1

Answer: **rotation of 180 degrees about the origin**

Question 14

A' = (-5, -6)	B1
B' = (-2, 2)	B1

Answer: **(-5, -6), (-2, 2)**

Question 15

reflection carried out	M1
intermediate image (-1, -5)	A1
(-4, -9) cao	A1

Answer: **(-4, -9)**

Question 16

reflection carried out	M1
intermediate image (-1, -2)	A1
(-1, 1) cao	A1

Answer: **(-1, 1)**

Question 17

A' = (-5, 3)	B1
B' = (0, 6)	B1

Answer: **(-5, 3), (0, 6)**

Question 18

vector from the centre to P found	M1
rotated correctly	M1
(0, 5) cao	A1

Answer: **(0, 5)**

Question 19

reflection carried out	M1
intermediate image (-1, -4)	A1
(-2, 0) cao	A1

Answer: **(-2, 0)**

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Question 20

reflection carried out	M1
intermediate image (3, -5)	A1
(0, -7) cao	A1

Answer: **(0, -7)**

Question 21

correct type of transformation identified	M1
reflection in the x-axis cao	A1

Answer: **reflection in the x-axis**

Question 22

A' = (6, 6)	B1
B' = (-2, -1)	B1

Answer: **(6, 6), (-2, -1)**

Question 23

vector from the centre to P found	M1
rotated correctly	M1
(1, 3) cao	A1

Answer: **(1, 3)**

Question 24

vector from the centre to P found	M1
rotated correctly	M1
(-7, 4) cao	A1

Answer: **(-7, 4)**

Question 25

vector from the centre to P found	M1
rotated correctly	M1
(5, -5) cao	A1

Answer: **(5, -5)**

Question 26

correct type of transformation identified	M1
rotation of 180 degrees about the origin cao	A1

Answer: **rotation of 180 degrees about the origin**

Question 27

vector from the centre to P found	M1
rotated correctly	M1
(-3, 0) cao	A1

Answer: **(-3, 0)**

Question 28

correct type of transformation identified	M1
rotation of 90 degrees clockwise about the origin cao	A1

Answer: **rotation of 90 degrees clockwise about the origin**

Question 29

correct type of transformation identified	M1
reflection in the line y = x cao	A1

Answer: **reflection in the line y = x**

Question 30

vector from the centre to P found	M1
rotated correctly	M1
(-1, -4) cao	A1

Answer: **(-1, -4)**

Question 31

reflection carried out	M1
intermediate image (3, 4)	A1
(6, 6) cao	A1

Answer: **(6, 6)**

Question 32

vector from the centre to P found	M1
rotated correctly	M1
(-2, 9) cao	A1

Answer: **(-2, 9)**

Question 33

vector from the centre to P found	M1
rotated correctly	M1
(0, 3) cao	A1

Answer: **(0, 3)**

Question 34

method: find horizontal distance from H to the line x = -1 and reflect across it	M1
H' (2, -3) cao	A1

Answer: **(2, -3)**

Question 35

method for rotation about X shown, e.g. translate so X is the origin and apply the rotation rule	M1
apply rotation to at least two points correctly (examples: Y -> (2, 5), Z -> (-1, 1))	M1
reflect in y = 0 shown (y -> -y) for at least one point	M1
final points X'(2, -1), Y'(2, -5), Z'(-1, -1) cao (in any order)	A1

Answer: **X'(2, -1), Y'(2, -5), Z'(-1, -1)**

Question 36

(5, -2) cao	B1

Answer: **(5, -2)**

Question 37

method: (x, y) -> (-x, -y) or description	M1
(0, 4) cao	A1

Answer: **(0, 4)**

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