HIGHER

3.6 Geometric Transformations: Reflection, Rotation, Enlargement and Translation: 1-hour Pack

EDEXCEL 4MA1 · Calculator allowed · about 60 minutes

Total Marks

Name: _____ Date: ____ / ____ / _____

Answer ALL questions. Show all your working.

1 Triangle PQR has vertices P(2, -4), Q(5, 3), R(0, 1).
Triangle PQR is reflected in the line y = 2.
Write down the coordinates of the vertices of the image P'Q'R'.

(Total for Question 1 is 3 marks)

2 Triangle XYZ has vertices X(-4, 4), Y(-4, -3), Z(6, 3).
Triangle XYZ is rotated 90 degrees clockwise about the point (-1, 0).
Write down the coordinates of the vertices of the image X'Y'Z'.

(Total for Question 2 is 3 marks)

3 Triangle LMN has vertices L(-5, 5), M(6, 2), N(1, 4).
Triangle LMN is translated to triangle L'M'N' with L' = (2, 3).
Describe fully the single transformation, and write down where M goes.

(Total for Question 3 is 3 marks)

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4 Triangle ABC has vertices A(-4, 4), B(-3, -1), C(-4, -3). Its image A'B'C' has vertices A'(-7, 10), B'(-5, 0), C'(-7, -4).
Describe fully the single transformation that maps ABC onto A'B'C'.

(Total for Question 4 is 4 marks)

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5 Triangle XYZ has vertices X(6, -3), Y(1, -4), Z(2, 6). Its image X'Y'Z' has vertices X'(5, -4), Y'(6, 1), Z'(-4, 0).
Describe fully the single transformation that maps XYZ onto X'Y'Z'.

(Total for Question 5 is 3 marks)

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6 Triangle ABC has vertices A(-5, -4), B(5, 0), C(3, 5). Its image A'B'C' has vertices A'(7, -4), B'(3, 6), C'(-2, 4).
Describe fully the single transformation that maps ABC onto A'B'C'.

(Total for Question 6 is 4 marks)

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7 Triangle ABC has vertices A(3, 1), B(2, -5), C(4, 5).
Triangle ABC is reflected in the line $y = x + 1$.
Write down the coordinates of the vertices of the image A'B'C'.

(Total for Question 7 is 3 marks)

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8 Triangle ABC has vertices A(-5, -3), B(0, -3), C(5, -4).
Triangle ABC is rotated 90 degrees anticlockwise about the origin.
Write down the coordinates of the vertices of the image A'B'C'.

(Total for Question 8 is 3 marks)

9 Triangle ABC has vertices A(-3, -4), B(1, 6), C(-5, 0).
Triangle ABC is translated to triangle A'B'C' with A' = (-3, 1).
Describe fully the single transformation, and write down where B goes.

(Total for Question 9 is 3 marks)

10 Triangle PQR has vertices P(-4, 5), Q(-3, 2), R(-4, 0). Its image P'Q'R' has vertices P'(-2, 7), Q'(1, 6), R'(3, 7).
Describe fully the single transformation that maps PQR onto P'Q'R'.

(Total for Question 10 is 3 marks)

11 Triangle XYZ has vertices X(5, -5), Y(1, -2), Z(-2, -4). Its image X'Y'Z' has vertices X'(7, 1), Y'(4, -3), Z'(6, -6).
Describe fully the single transformation that maps XYZ onto X'Y'Z'.

(Total for Question 11 is 4 marks)

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12 Triangle PQR has vertices P(-3, -1), Q(4, -2), R(-1, 0).
Triangle PQR is enlarged with scale factor 3 and centre the point (2, 1).
Write down the coordinates of the vertices of the image P'Q'R'.

(Total for Question 12 is 3 marks)

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13 Triangle ABC has vertices A(0, 0), B(0, 5), C(3, 6).
Triangle ABC is rotated 180 degrees about the origin.
Write down the coordinates of the vertices of the image A'B'C'.

(Total for Question 13 is 3 marks)

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Mark scheme · 3.6 Geometric Transformations: Reflection, Rotation, Enlargement and Translation: 1-hour Pack

Question 1

each point and its image are the same perpendicular distance from the mirror line, on opposite sides	**M1**
at least two image vertices correct, e.g. P'(2, 8)	**A1**
P'(2, 8), Q'(5, 1), R'(0, 3)	**A1**

Answer: P'(2, 8), Q'(5, 1), R'(0, 3)

Question 2

uses the centre of rotation to find each vertex's position relative to the centre, then turns it	**M1**
at least two image vertices correct, e.g. X'(3, 3)	**A1**
X'(3, 3), Y'(-4, 3), Z'(2, -7)	**A1**

Answer: X'(3, 3), Y'(-4, 3), Z'(2, -7)

Question 3

vector = L' - L = [7; -2]	**M1**
translation by the vector [7; -2]	**A1**
M' = (13, 0)	**A1**

Answer: Translation by the vector [7; -2]; M' = (13, 0)

Question 4

identifies an enlargement	**B1**
scale factor from a pair of corresponding sides or distances: 2	**M1**
centre found where the lines joining corresponding vertices meet	**M1**
Enlargement with scale factor 2, centre (-1, -2)	**A1**

Answer: Enlargement with scale factor 2, centre (-1, -2)

Question 5

identifies a reflection (the shape is flipped, with the same size)	**B1**
finds the midpoint of X and X' or the perpendicular bisector of this pair of points	**M1**
Reflection in the line y = -x + 2	**A1**

Answer: Reflection in the line y = -x + 2

Question 6

identifies a rotation (the shape is turned, with the same size)	**B1**
angle and direction: 90 degrees anticlockwise	**B1**
finds the centre, e.g. from the perpendicular bisectors of AA' and BB', or by testing a point	**M1**
centre (1, 2)	**A1**

Answer: Rotation of 90 degrees anticlockwise about (1, 2)

Question 7

each point and its image are the same perpendicular distance from the mirror line, on opposite sides	**M1**
at least two image vertices correct, e.g. A'(0, 4)	**A1**
A'(0, 4), B'(-6, 3), C'(4, 5)	**A1**

Answer: A'(0, 4), B'(-6, 3), C'(4, 5)

Question 8

uses the centre of rotation to find each vertex's position relative to the centre, then turns it	**M1**
at least two image vertices correct, e.g. A'(3, -5)	**A1**
A'(3, -5), B'(3, 0), C'(4, 5)	**A1**

Answer: A'(3, -5), B'(3, 0), C'(4, 5)

Question 9

vector = A' - A = [0; 5]	**M1**
translation by the vector [0; 5]	**A1**
B' = (1, 11)	**A1**

Answer: Translation by the vector [0; 5]; B' = (1, 11)

Question 10

identifies a reflection (the shape is flipped, with the same size)	**B1**
finds the midpoint of P and P' or the perpendicular bisector of this pair of points	**M1**
Reflection in the line y = -x + 3	**A1**

Answer: Reflection in the line y = -x + 3

Question 11

identifies a rotation (the shape is turned, with the same size)	**B1**
angle and direction: 90 degrees anticlockwise	**B1**
finds the centre, e.g. from the perpendicular bisectors of XX' and YY', or by testing a point	**M1**
centre (3, -1)	**A1**

Answer: Rotation of 90 degrees anticlockwise about (3, -1)

Question 12

multiplies the distance of each vertex from the centre by 3 (a negative factor puts the image on the other side of the centre)	**M1**
at least two image vertices correct, e.g. P'(-13, -5)	**A1**
P'(-13, -5), Q'(8, -8), R'(-7, -2)	**A1**

Answer: P'(-13, -5), Q'(8, -8), R'(-7, -2)

Question 13

uses the centre of rotation to find each vertex's position relative to the centre, then turns it	**M1**
at least two image vertices correct, e.g. A'(0, 0)	**A1**
A'(0, 0), B'(0, -5), C'(-3, -6)	**A1**

Answer: A'(0, 0), B'(0, -5), C'(-3, -6)

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