θ = Angle of Rotation
Rotation Formula
\[ x_1 = x \cos(\theta) - y \sin(\theta) \]
\[ y_1 = x \sin(\theta) + y \cos(\theta) \]

In the example to the right the shape is at coordinates (1,4). Let’s find the coordinates if we rotated the shape 60°.

1. \[ x_1 = 1 \times \cos(60) - 4 \times \sin(60) \]
   \[ y_1 = 1 \times \sin(60) + 4 \times \cos(60) \]

2. \[ x_1 = 1 \times 0.5 - 4 \times 0.87 \]
   \[ y_1 = 1 \times 0.87 + 4 \times 0.5 \]

3. \[ x_1 = 0.5 - 3.48 \]
   \[ y_1 = 0.87 + 2 \]

4. \[ x_1 = -2.98 \]
   \[ y_1 = 2.87 \]

5. Looking at shape, we can see that rotated 60° it is at (-2.98, 2.87).

1) Rotate the shape 314° around the point (0,0).

2) Rotate the shape -76° around the point (0,0).

3) Rotate the shape 124° around the point (0,0).

4) Rotate the shape -138° around the point (0,0).
In the example to the right the shape is at coordinates (1,4). Let's find the coordinates if we rotated the shape 60°.

\[ x_1 = x\cos(\theta) - y\sin(\theta) \]
\[ y_1 = x\sin(\theta) + y\cos(\theta) \]

1. \[ x_1 = 1\cos(60) - 4\sin(60) \]
\[ y_1 = 1\sin(60) + 4\cos(60) \]
2. \[ x_1 = 1\times0.5 - 4\times0.87 \]
\[ y_1 = 1\times0.87 + 4\times0.5 \]
3. \[ x_1 = 0.5 - 3.48 \]
\[ y_1 = 0.87 + 2 \]
4. \[ x_1 = -2.98 \]
\[ y_1 = 2.87 \]
5. Looking at shape, we can see that rotated 60° it is at (-2.98, 2.87).

Answer Key

1. (-0.9, -9.2)
2. (5.8, -2.7)
3. (4.1, 6.4)
4. (1.3, -2.9)

Rotating Around Axis

**1)** Rotate the shape 314° around the point (0,0).

**2)** Rotate the shape -76° around the point (0,0).

**3)** Rotate the shape 124° around the point (0,0).

**4)** Rotate the shape -138° around the point (0,0).
Rotate each shape. Answer as the new coordinates.

θ = Angle of Rotation
Rotation Formula
\[ x_1 = x \cos(\theta) - y \sin(\theta) \]
\[ y_1 = x \sin(\theta) + y \cos(\theta) \]

In the example to the right the shape is at coordinates (1,4). Lets find the coordinates if we rotated the shape 60°.

1. \[ x_1 = 1 \cos(60) - 4 \sin(60) \]
   \[ y_1 = 1 \sin(60) + 4 \cos(60) \]
2. \[ x_1 = 1 \times 0.5 - 4 \times 0.87 \]
   \[ y_1 = 1 \times 0.87 + 4 \times 0.5 \]
3. \[ x_1 = 0.5 - 3.48 \]
   \[ y_1 = 0.87 + 2 \]
4. \[ x_1 = -2.98 \]
   \[ y_1 = 2.87 \]
5. Looking at shape, we can see that rotated 60° it is at (-2.98, 2.87).

1) Rotate the shape -322° around the point (0,0).

2) Rotate the shape 86° around the point (0,0).

3) Rotate the shape -113° around the point (0,0).

4) Rotate the shape 80° around the point (0,0).
θ = Angle of Rotation

Rotation Formula

\[ x_1 = x \times \cos(\theta) - y \times \sin(\theta) \]
\[ y_1 = x \times \sin(\theta) + y \times \cos(\theta) \]

In the example to the right the shape is at coordinates (1,4). Let's find the coordinates if we rotated the shape 60°.

1. \[ x_1 = 1 \times \cos(60°) - 4 \times \sin(60°) \]
   \[ y_1 = 1 \times \sin(60°) + 4 \times \cos(60°) \]

2. \[ x_1 = 1 \times 0.5 - 4 \times 0.87 \]
   \[ y_1 = 1 \times 0.87 + 4 \times 0.5 \]

3. \[ x_1 = 0.5 - 3.48 \]
   \[ y_1 = 0.87 + 2 \]

4. \[ x_1 = -2.98 \]
   \[ y_1 = 2.87 \]

5. Looking at the shape, we can see that rotated 60° it is at (-2.98, 2.87).

1) Rotate the shape -322° around the point (0,0).

2) Rotate the shape 86° around the point (0,0).

3) Rotate the shape -113° around the point (0,0).

4) Rotate the shape 80° around the point (0,0).
θ = Angle of Rotation
Rotation Formula
\[ x_1 = x \cos(\theta) - y \sin(\theta) \]
\[ y_1 = x \sin(\theta) + y \cos(\theta) \]

In the example to the right the shape is at coordinates (1,4). Let’s find the coordinates if we rotated the shape 60°.

1. \[ x_1 = 1 \cos(60) - 4 \sin(60) \]
   \[ y_1 = 1 \sin(60) + 4 \cos(60) \]

2. \[ x_1 = 1 \times 0.5 - 4 \times 0.87 \]
   \[ y_1 = 1 \times 0.87 + 4 \times 0.5 \]

3. \[ x_1 = 0.5 - 3.48 \]
   \[ y_1 = 0.87 + 2 \]

4. \[ x_1 = -2.98 \]
   \[ y_1 = 2.87 \]

5. Looking at shape, we can see that rotated 60° it is at (-2.98, 2.87).

1) Rotate the shape -299° around the point (0,0).

2) Rotate the shape -221° around the point (0,0).

3) Rotate the shape -214° around the point (0,0).

4) Rotate the shape -246° around the point (0,0).

Answers:

1. 
2. 
3. 
4. 

Math
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Rotate each shape. Answer as the new coordinates.

θ = Angle of Rotation
Rotation Formula
\[ x_1 = x \cos(\theta) - y \sin(\theta) \]
\[ y_1 = x \sin(\theta) + y \cos(\theta) \]

In the example to the right the shape is at coordinates (1,4). Let's find the coordinates if we rotated the shape 60°.

1. \[ x_1 = 1 \cos(60) - 4 \sin(60) \]
   \[ y_1 = 1 \sin(60) + 4 \cos(60) \]
2. \[ x_1 = 1 \times 0.5 - 4 \times 0.87 \]
   \[ y_1 = 1 \times 0.87 + 4 \times 0.5 \]
3. \[ x_1 = 0.5 - 3.48 \]
   \[ y_1 = 0.87 + 2 \]
4. \[ x_1 = -2.98 \]
   \[ y_1 = 2.87 \]
5. Looking at shape, we can see that rotated 60° it is at (-2.98, 2.87).

1) Rotate the shape -299° around the point (0,0).
2) Rotate the shape -221° around the point (0,0).
3) Rotate the shape -214° around the point (0,0).
4) Rotate the shape -246° around the point (0,0).

Answers
1. (0.3, 6.7)
2. (-5.6, -0.4)
3. (0.3, 2.2)
4. (-6.5, 4.8)
θ = Angle of Rotation

**Rotation Formula**

\[
x_1 = x \times \cos(\theta) - y \times \sin(\theta)
\]

\[
y_1 = x \times \sin(\theta) + y \times \cos(\theta)
\]

In the example to the right the shape is at coordinates (1,4). Let's find the coordinates if we rotated the shape 60°.

1. \[x_1 = 1 \times \cos(60) - 4 \times \sin(60)
\]
   \[y_1 = 1 \times \sin(60) + 4 \times \cos(60)
\]

2. \[x_1 = 1 \times 0.5 - 4 \times 0.87
\]
   \[y_1 = 1 \times 0.87 + 4 \times 0.5
\]

3. \[x_1 = 0.5 - 3.48
\]
   \[y_1 = 0.87 + 2
\]

4. \[x_1 = -2.98
\]
   \[y_1 = 2.87
\]

5. Looking at shape, we can see that rotated 60° it is at (-2.98, 2.87).

1) Rotate the shape 261° around the point (0,0).

2) Rotate the shape 56° around the point (0,0).

3) Rotate the shape 117° around the point (0,0).

4) Rotate the shape 202° around the point (0,0).
**Rotating Around Axis**

**θ = Angle of Rotation**

**Rotation Formula**

\[ x_1 = x \times \cos(\theta) - y \times \sin(\theta) \]

\[ y_1 = x \times \sin(\theta) + y \times \cos(\theta) \]

In the example to the right the shape is at coordinates (1,4). Let's find the coordinates if we rotated the shape 60°.

1. \[ x_1 = 1 \times \cos(60°) - 4 \times \sin(60°) \]
   \[ y_1 = 1 \times \sin(60°) + 4 \times \cos(60°) \]

2. \[ x_1 = 1 \times 0.5 - 4 \times 0.87 \]
   \[ y_1 = 1 \times 0.87 + 4 \times 0.5 \]

3. \[ x_1 = 0.5 - 3.48 \]
   \[ y_1 = 0.87 + 2 \]

4. \[ x_1 = -2.98 \]
   \[ y_1 = 2.87 \]

5. Looking at shape, we can see that rotated 60° it is at (-2.98, 2.87).

1) Rotate the shape 261° around the point (0,0).

2) Rotate the shape 56° around the point (0,0).

3) Rotate the shape 117° around the point (0,0).

4) Rotate the shape 202° around the point (0,0).

**Answers**

1. (1.7, -2.3)
2. (4.7, -5.6)
3. (-1.3, 0.4)
4. (-3.4, 3)
θ = Angle of Rotation
Rotation Formula
\[ x_1 = x \times \cos(\theta) - y \times \sin(\theta) \]
\[ y_1 = x \times \sin(\theta) + y \times \cos(\theta) \]

In the example to the right the shape is at coordinates (1,4). Let's find the coordinates if we rotated the shape 60°.

1. \[ x_1 = 1 \times \cos(60) - 4 \times \sin(60) \]
   \[ y_1 = 1 \times \sin(60) + 4 \times \cos(60) \]

2. \[ x_1 = 1 \times 0.5 - 4 \times 0.87 \]
   \[ y_1 = 1 \times 0.87 + 4 \times 0.5 \]

3. \[ x_1 = 0.5 - 3.48 \]
   \[ y_1 = 0.87 + 2 \]

4. \[ x_1 = -2.98 \]
   \[ y_1 = 2.87 \]

5. Looking at shape, we can see that rotated 60° it is at (-2.98, 2.87).

1) Rotate the shape 193° around the point (0,0).

2) Rotate the shape -207° around the point (0,0).

3) Rotate the shape -188° around the point (0,0).

4) Rotate the shape -79° around the point (0,0).
\[ \theta = \text{Angle of Rotation} \]

\[ \text{Rotation Formula} \]

\[ x_1 = x \times \cos(\theta) - y \times \sin(\theta) \]
\[ y_1 = x \times \sin(\theta) + y \times \cos(\theta) \]

In the example to the right the shape is at coordinates (1,4). Let's find the coordinates if we rotated the shape \( 60^\circ \).

1. \[ x_1 = 1 \times \cos(60) - 4 \times \sin(60) \]
   \[ y_1 = 1 \times \sin(60) + 4 \times \cos(60) \]

2. \[ x_1 = 1 \times 0.5 - 4 \times 0.87 \]
   \[ y_1 = 1 \times 0.87 + 4 \times 0.5 \]

3. \[ x_1 = 0.5 - 3.48 \]
   \[ y_1 = 0.87 + 2 \]

4. \[ x_1 = -2.98 \]
   \[ y_1 = 2.87 \]

5. Looking at the shape, we can see that rotated \( 60^\circ \) it is at \((-2.98, 2.87)\).

1. Rotate the shape \( 193^\circ \) around the point (0,0).

2. Rotate the shape \( -207^\circ \) around the point (0,0).

3. Rotate the shape \( -188^\circ \) around the point (0,0).

4. Rotate the shape \( -79^\circ \) around the point (0,0).

Answers:
1. \((-5,4)\)
2. \((3.1, -7.2)\)
3. \((6.6, 4.1)\)
4. \((1.4, -1.8)\)
θ = Angle of Rotation
**Rotation Formula**

\[
x_1 = x\cos(\theta) - y\sin(\theta)
\]

\[
y_1 = x\sin(\theta) + y\cos(\theta)
\]

In the example to the right the shape is at coordinates (1,4). Lets find the coordinates if we rotated the shape 60°.

1. \[
x_1 = 1\cos(60) - 4\sin(60)
\]
   \[
y_1 = 1\sin(60) + 4\cos(60)
\]

2. \[
x_1 = 1\times0.5 - 4\times0.87
\]
   \[
y_1 = 1\times0.87 + 4\times0.5
\]

3. \[
x_1 = 0.5 - 3.48
\]
   \[
y_1 = 0.87 + 2
\]

4. \[
x_1 = -2.98
\]
   \[
y_1 = 2.87
\]

5. Looking at shape, we can see that rotated 60° it is at (-2.98, 2.87).

1) Rotate the shape 70° around the point (0,0).

2) Rotate the shape -194° around the point (0,0).

3) Rotate the shape 236° around the point (0,0).

4) Rotate the shape 170° around the point (0,0).
Rotate each shape. Answer as the new coordinates.

θ = Angle of Rotation
Rotation Formula
\[ x_1 = x \cos(\theta) - y \sin(\theta) \]
\[ y_1 = x \sin(\theta) + y \cos(\theta) \]

In the example to the right the shape is at coordinates (1,4). Let's find the coordinates if we rotated the shape 60°.

1. \[ x_1 = 1 \times \cos(60) - 4 \times \sin(60) \]
\[ y_1 = 1 \times \sin(60) + 4 \times \cos(60) \]

2. \[ x_1 = 1 \times 0.5 - 4 \times 0.87 \]
\[ y_1 = 1 \times 0.87 + 4 \times 0.5 \]

3. \[ x_1 = 0.5 - 3.48 \]
\[ y_1 = 0.87 + 2 \]

4. \[ x_1 = -2.98 \]
\[ y_1 = 2.87 \]

5. Looking at the shape, we can see that rotated 60° it is at (-2.98, 2.87).

1) Rotate the shape 70° around the point (0,0).

2) Rotate the shape -194° around the point (0,0).

3) Rotate the shape 236° around the point (0,0).

4) Rotate the shape 170° around the point (0,0).

Answers

1. (-7.6, -0.4)
2. (-2.4, 2.7)
3. (0.3, 2.2)
4. (-2.3, 4.5)
θ = Angle of Rotation

**Rotation Formula**

\[ x_1 = x \cos(\theta) - y \sin(\theta) \]
\[ y_1 = x \sin(\theta) + y \cos(\theta) \]

In the example to the right the shape is at coordinates (1,4). Let's find the coordinates if we rotated the shape 60°.

1. \[ x_1 = 1 \cos(60) - 4 \sin(60) \]
\[ y_1 = 1 \sin(60) + 4 \cos(60) \]
2. \[ x_1 = 1 \times 0.5 - 4 \times 0.87 \]
\[ y_1 = 1 \times 0.87 + 4 \times 0.5 \]
3. \[ x_1 = 0.5 - 3.48 \]
\[ y_1 = 0.87 + 2 \]
4. \[ x_1 = -2.98 \]
\[ y_1 = 2.87 \]
5. Looking at the shape, we can see that rotated 60° it is at (-2.98, 2.87).

1) Rotate the shape -212° around the point (0,0).

2) Rotate the shape 46° around the point (0,0).

3) Rotate the shape 211° around the point (0,0).

4) Rotate the shape 218° around the point (0,0).
θ = Angle of Rotation

**Rotation Formula**

\[ x_1 = x \cos(\theta) - y \sin(\theta) \]
\[ y_1 = x \sin(\theta) + y \cos(\theta) \]

In the example to the right the shape is at coordinates (1,4). Let's find the coordinates if we rotated the shape 60°.

1. \[ x_1 = 1 \cos(60) - 4 \sin(60) \]
   \[ y_1 = 1 \sin(60) + 4 \cos(60) \]

2. \[ x_1 = 1 \times 0.5 - 4 \times 0.87 \]
   \[ y_1 = 1 \times 0.87 + 4 \times 0.5 \]

3. \[ x_1 = 0.5 - 3.48 \]
   \[ y_1 = 0.87 + 2 \]

4. \[ x_1 = -2.98 \]
   \[ y_1 = 2.87 \]

5. Looking at shape, we can see that rotated 60° it is at (-2.98, 2.87).

**Answers**

1. \((-0.2, 7.2)\)
2. \((7.8, -0.6)\)
3. \((1.2, 1.9)\)
4. \((2.3, -4.6)\)
θ = Angle of Rotation
Rotation Formula
\[ x_1 = x \cos(\theta) - y \sin(\theta) \]
\[ y_1 = x \sin(\theta) + y \cos(\theta) \]

In the example to the right the shape is at coordinates (1,4). Let's find the coordinates if we rotated the shape 60°.

1. \[ x_1 = 1 \cos(60) - 4 \sin(60) \]
   \[ y_1 = 1 \sin(60) + 4 \cos(60) \]
2. \[ x_1 = 1 \times 0.5 - 4 \times 0.87 \]
   \[ y_1 = 1 \times 0.87 + 4 \times 0.5 \]
3. \[ x_1 = 0.5 - 3.48 \]
   \[ y_1 = 0.87 + 2 \]
4. \[ x_1 = -2.98 \]
   \[ y_1 = 2.87 \]
5. Looking at the shape, we can see that rotated 60° it is at (-2.98, 2.87).

1) Rotate the shape 297° around the point (0,0).
2) Rotate the shape -303° around the point (0,0).
3) Rotate the shape 251° around the point (0,0).
4) Rotate the shape 221° around the point (0,0).
Rotating Around Axis

**Rotate each shape. Answer as the new coordinates.**

θ = Angle of Rotation  
**Rotation Formula**  
\[ x_1 = x \cos(\theta) - y \sin(\theta) \]  
\[ y_1 = x \sin(\theta) + y \cos(\theta) \]

In the example to the right the shape is at coordinates (1,4). Let's find the coordinates if we rotated the shape 60°.

1. \[ x_1 = 1 \cos(60) - 4 \sin(60) \]  
2. \[ y_1 = 1 \sin(60) + 4 \cos(60) \]

Looking at the shape, we can see that rotated 60° it is at (-2.98, 2.87).

---

1) Rotate the shape 297° around the point (0,0).

2) Rotate the shape -303° around the point (0,0).

3) Rotate the shape 251° around the point (0,0).

4) Rotate the shape 221° around the point (0,0).

---

**Answers**

1. (-5.4, 1.7)  
2. (1.8, -8.3)  
3. (-5.1, -5.6)  
4. (3.5, -1)  

---

**Rotating Around Axis**  
**Rotate each shape. Answer as the new coordinates.**  

θ = Angle of Rotation  
**Rotation Formula**  
\[ x_1 = x \cos(\theta) - y \sin(\theta) \]  
\[ y_1 = x \sin(\theta) + y \cos(\theta) \]  

In the example to the right the shape is at coordinates (1,4). Let's find the coordinates if we rotated the shape 60°.

1. \[ x_1 = 1 \cos(60) - 4 \sin(60) \]  
2. \[ y_1 = 1 \sin(60) + 4 \cos(60) \]

Looking at the shape, we can see that rotated 60° it is at (-2.98, 2.87).

---

1) Rotate the shape 297° around the point (0,0).

2) Rotate the shape -303° around the point (0,0).

3) Rotate the shape 251° around the point (0,0).

4) Rotate the shape 221° around the point (0,0).
θ = Angle of Rotation

Rotation Formula
\[ x_1 = x \times \cos(\theta) - y \times \sin(\theta) \]
\[ y_1 = x \times \sin(\theta) + y \times \cos(\theta) \]

In the example to the right the shape is at coordinates (1,4). Let's find the coordinates if we rotated the shape 60°.

1. \[ x_1 = 1 \times \cos(60) - 4 \times \sin(60) \]
   \[ y_1 = 1 \times \sin(60) + 4 \times \cos(60) \]
2. \[ x_1 = 1 \times 0.5 - 4 \times 0.87 \]
   \[ y_1 = 1 \times 0.87 + 4 \times 0.5 \]
3. \[ x_1 = 0.5 - 3.48 \]
   \[ y_1 = 0.87 + 2 \]
4. \[ x_1 = -2.98 \]
   \[ y_1 = 2.87 \]
5. Looking at shape, we can see that rotated 60° it is at (-2.98, 2.87).

1) Rotate the shape 149° around the point (0,0).

2) Rotate the shape 218° around the point (0,0).

3) Rotate the shape 126° around the point (0,0).

4) Rotate the shape -79° around the point (0,0).
\[ \theta = \text{Angle of Rotation} \]

**Rotation Formula**

\[
x_1 = x \times \cos(\theta) - y \times \sin(\theta)
\]

\[
y_1 = x \times \sin(\theta) + y \times \cos(\theta)
\]

In the example to the right the shape is at coordinates (1,4). Let's find the coordinates if we rotated the shape 60°.

1. \[ x_1 = 1 \times \cos(60) - 4 \times \sin(60) \]
   \[ y_1 = 1 \times \sin(60) + 4 \times \cos(60) \]
2. \[ x_1 = 1 \times 0.5 - 4 \times 0.87 \]
   \[ y_1 = 1 \times 0.87 + 4 \times 0.5 \]
3. \[ x_1 = 0.5 - 3.48 \]
   \[ y_1 = 0.87 + 2 \]
4. \[ x_1 = -2.98 \]
   \[ y_1 = 2.87 \]
5. Looking at shape, we can see that rotated 60° it is at (-2.98, 2.87).

### Answers

1. (5.5, -4.5)
2. (-1.8, -9)
3. (-9, 2.1)
4. (3.7, 1.7)

1) Rotate the shape 149° around the point (0,0).

2) Rotate the shape 218° around the point (0,0).

3) Rotate the shape 126° around the point (0,0).

4) Rotate the shape -79° around the point (0,0).
θ = Angle of Rotation

**Rotation Formula**

\[
\begin{align*}
x_1 &= x \times \cos(\theta) - y \times \sin(\theta) \\
y_1 &= x \times \sin(\theta) + y \times \cos(\theta)
\end{align*}
\]

In the example to the right the shape is at coordinates (1,4). Let's find the coordinates if we rotated the shape 60°.

1. \(x_1 = 1 \times \cos(60) - 4 \times \sin(60)\)
   \(y_1 = 1 \times \sin(60) + 4 \times \cos(60)\)
2. \(x_1 = 1 \times 0.5 - 4 \times 0.87\)
   \(y_1 = 1 \times 0.87 + 4 \times 0.5\)
3. \(x_1 = 0.5 - 3.48\)
   \(y_1 = 0.87 + 2\)
4. \(x_1 = -2.98\)
   \(y_1 = 2.87\)
5. Looking at the shape, we can see that rotated 60° it is at (-2.98, 2.87).

1) Rotate the shape -279° around the point (0,0).

2) Rotate the shape -200° around the point (0,0).

3) Rotate the shape 64° around the point (0,0).

4) Rotate the shape 291° around the point (0,0).
θ = Angle of Rotation

Rotation Formula

\[ x_1 = x \cos(\theta) - y \sin(\theta) \]
\[ y_1 = x \sin(\theta) + y \cos(\theta) \]

In the example to the right the shape is at coordinates (1,4). Let’s find the coordinates if we rotated the shape 60°.

\[ x_1 = 1 \cos(60°) - 4 \sin(60°) \]
\[ y_1 = 1 \sin(60°) + 4 \cos(60°) \]
\[ x_1 = 1 \times 0.5 - 4 \times 0.87 \]
\[ y_1 = 1 \times 0.87 + 4 \times 0.5 \]
\[ x_1 = 0.5 - 3.48 \]
\[ y_1 = 0.87 + 2 \]
\[ x_1 = -2.98 \]
\[ y_1 = 2.87 \]

Looking at shape, we can see that rotated 60° it is at (-2.98, 2.87).

1) Rotate the shape -279° around the point (0,0).

2) Rotate the shape -200° around the point (0,0).

3) Rotate the shape 64° around the point (0,0).

4) Rotate the shape 291° around the point (0,0).

Answer Key

1. (1.5, 2.8)
2. (-4.2, -2.7)
3. (-0.2, 2.2)
4. (-1.7, 1.5)