MATHEMATICS · GRADES 10-12

Trigonometric signs in each quadrant

Difficulty level: Advanced

Mathematics: Grades 10-12

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Overview of the concept

This is how you get the sign right when you work with angles outside the first quadrant, like reading a compass bearing or a direction on a map, where the size is familiar but the sign can flip. An angle past ninety degrees points into a different part of the circle, and in each part some values are positive and others are negative. Knowing which is which in each quadrant stops you from giving an answer with the wrong sign. That matters whenever a direction matters, from a compass bearing to a position on a map.



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Rule

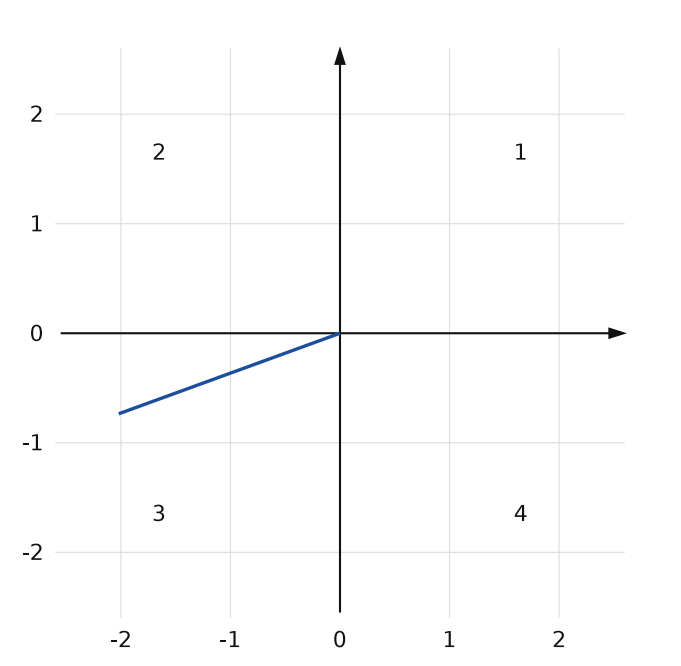
Trigonometric signs in each quadrant: in quadrant 1 all three ratios are positive, in quadrant 2 only sine is positive, in quadrant 3 only tangent is positive, and in quadrant 4 only cosine is positive.

Find the quadrant first, then read off the sign.

Worked examples

EXAMPLE 1

Q Is sin 200 degrees positive or negative?



SOLUTION

200 degrees is in quadrant 3.

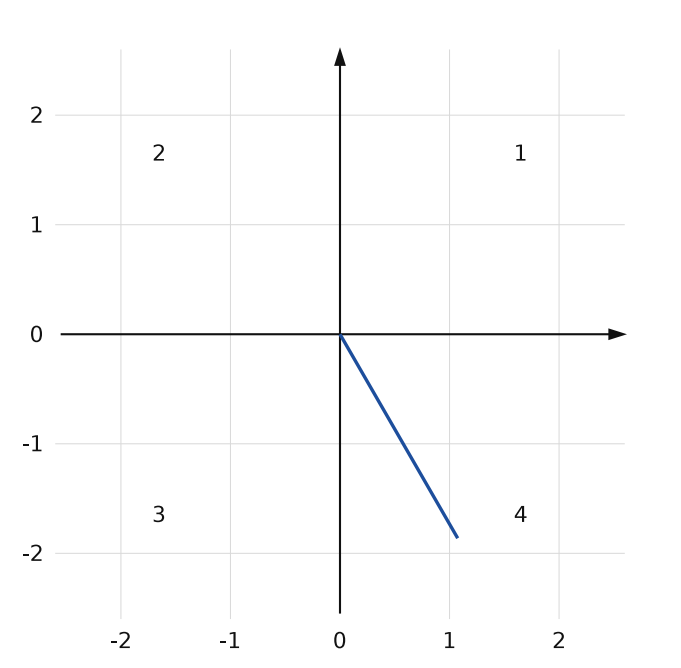
In quadrant 3, only tangent is positive, so sine is negative.

Sin 200 degrees is negative.

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EXAMPLE 2

Q Is cos 300 degrees positive or negative?



SOLUTION

300 degrees is in quadrant 4.

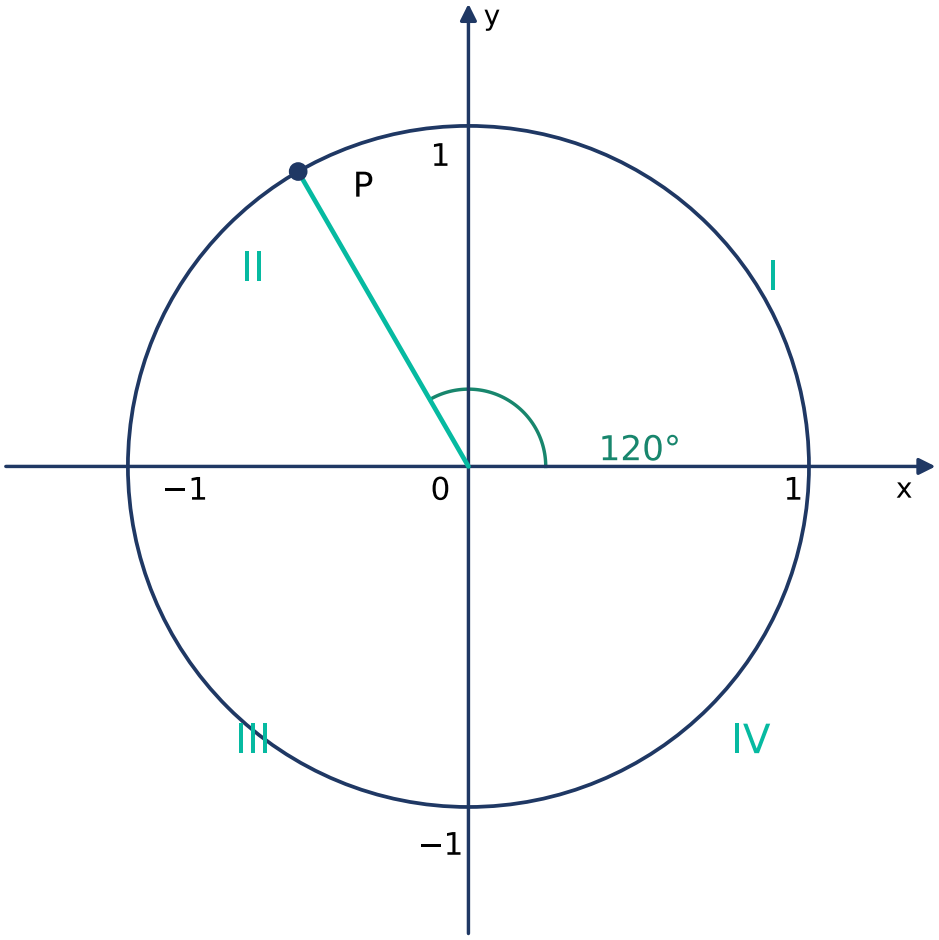
In quadrant 4, only cosine is positive.

Cos 300 degrees is positive.

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Practice questions

1 **A lighthouse beam points at 120 degrees. Is sin 120 degrees positive or negative?**



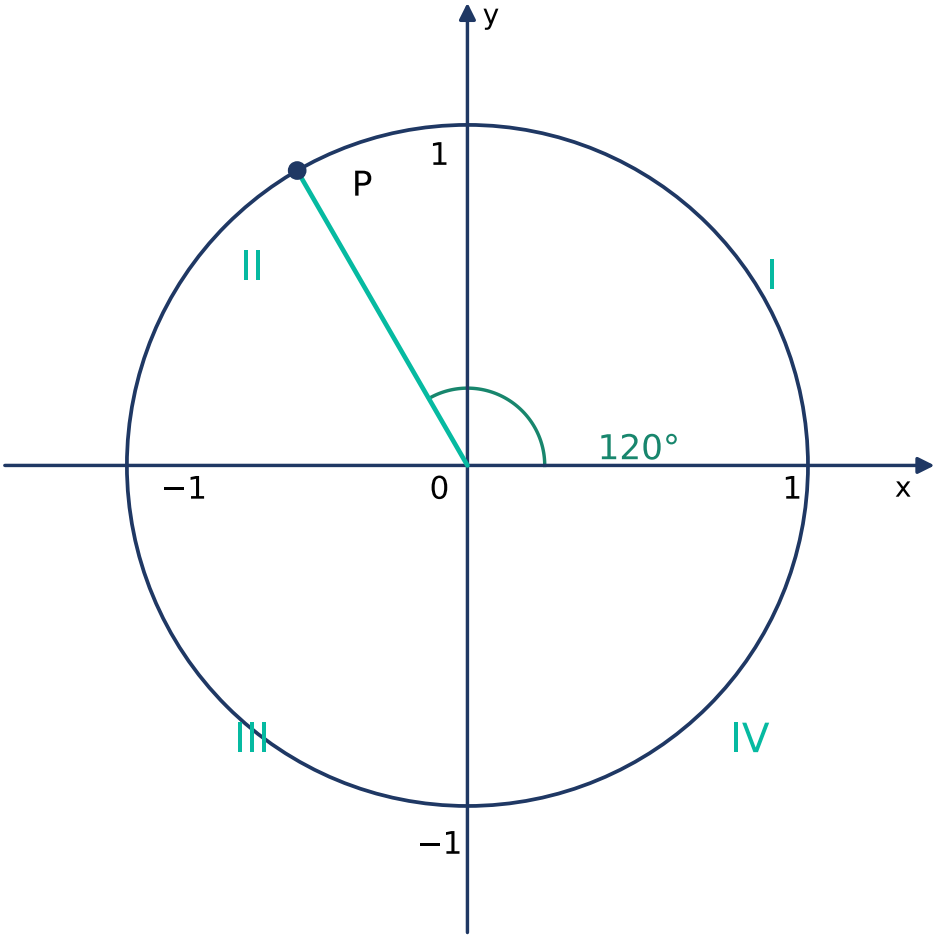
A Positive

B Negative

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2 The same beam sits at 120 degrees. Is cos 120 degrees positive or negative?



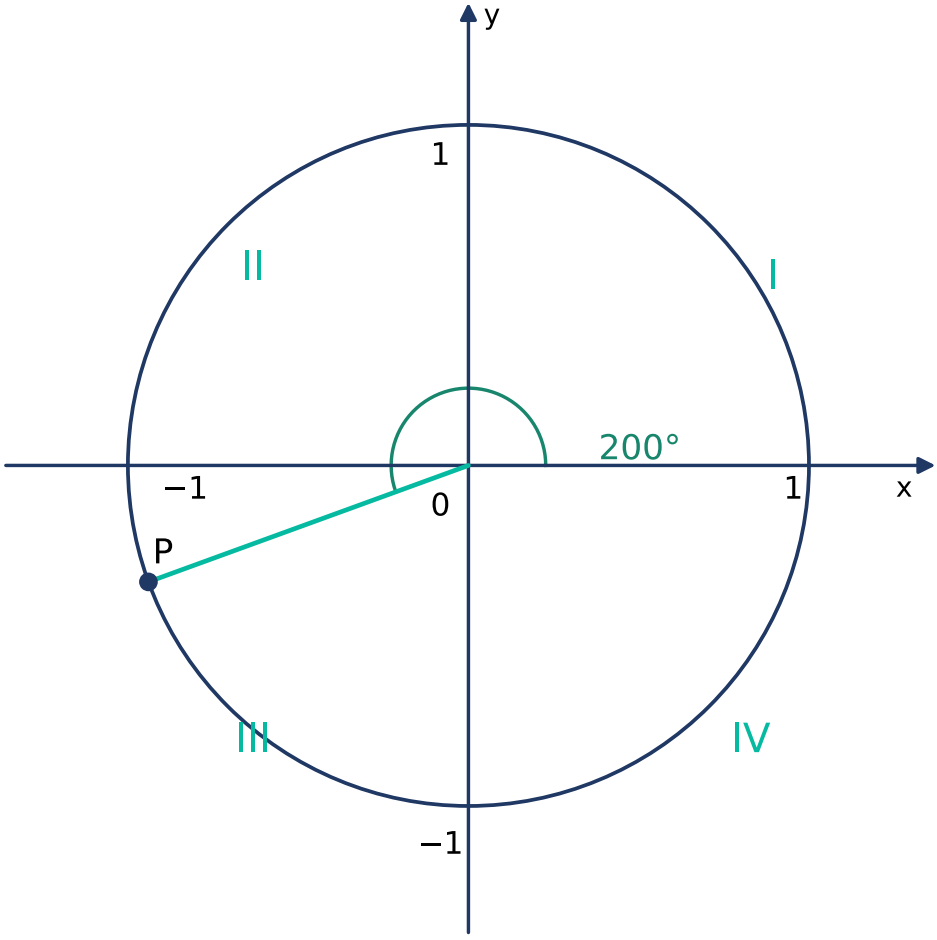
A Positive

B Negative

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3 **A ship sails on a bearing of 200 degrees. Is tan 200 degrees positive or negative?**



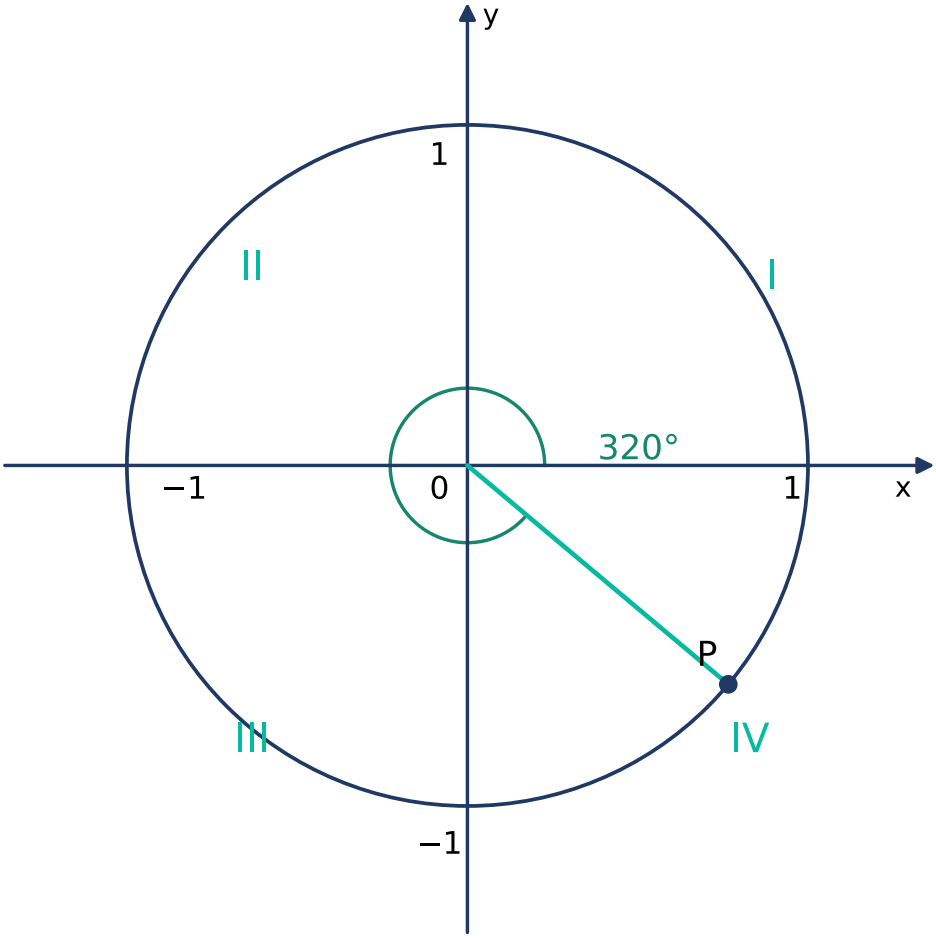
A Positive

B Negative

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4 A drone flies at 320 degrees. Is sin 320 degrees positive or negative?



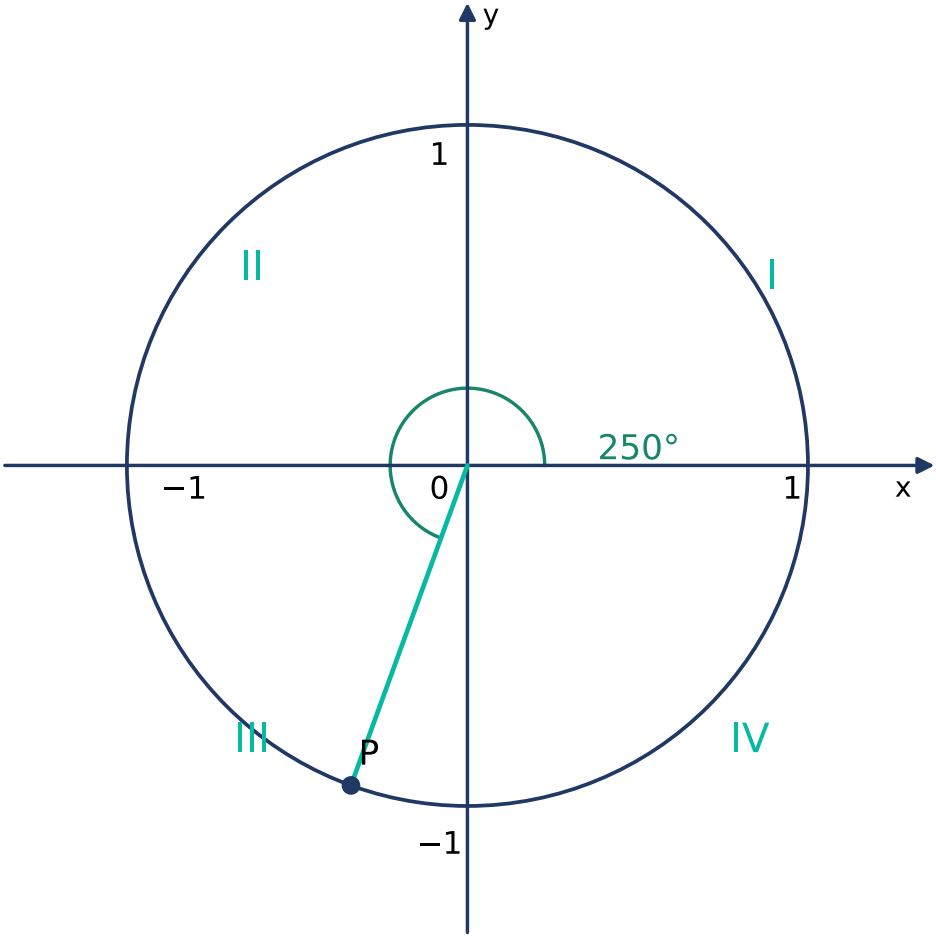
A Positive

B Negative

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5 A hiker walks on a bearing of 250 degrees. Is cos 250 degrees positive or negative?



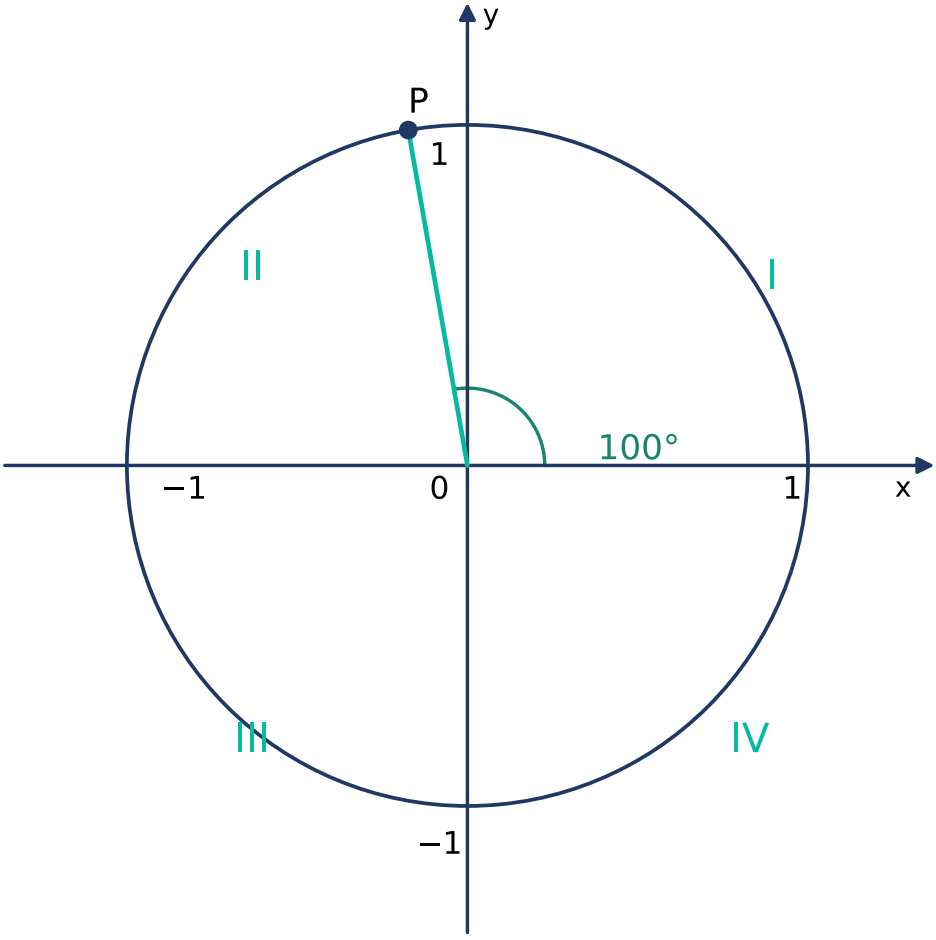
A Positive

B Negative

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6 **A ski lift cable runs at 100 degrees from the positive x-axis. Is tan 100 degrees positive or negative?**



A Positive

B Negative

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7 A navigator notes that sine is positive but cosine is negative. Which quadrant is the angle in?

- A Quadrant 1
- B Quadrant 2
- C Quadrant 3
- D Quadrant 4

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8 An angle has cosine positive, and sine and tangent negative. Which quadrant is it in?

- A Quadrant 1
- B Quadrant 2
- C Quadrant 3
- D Quadrant 4

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9

An angle has all three ratios positive. Which quadrant is it in?

A Quadrant 1

B Quadrant 2

C Quadrant 3

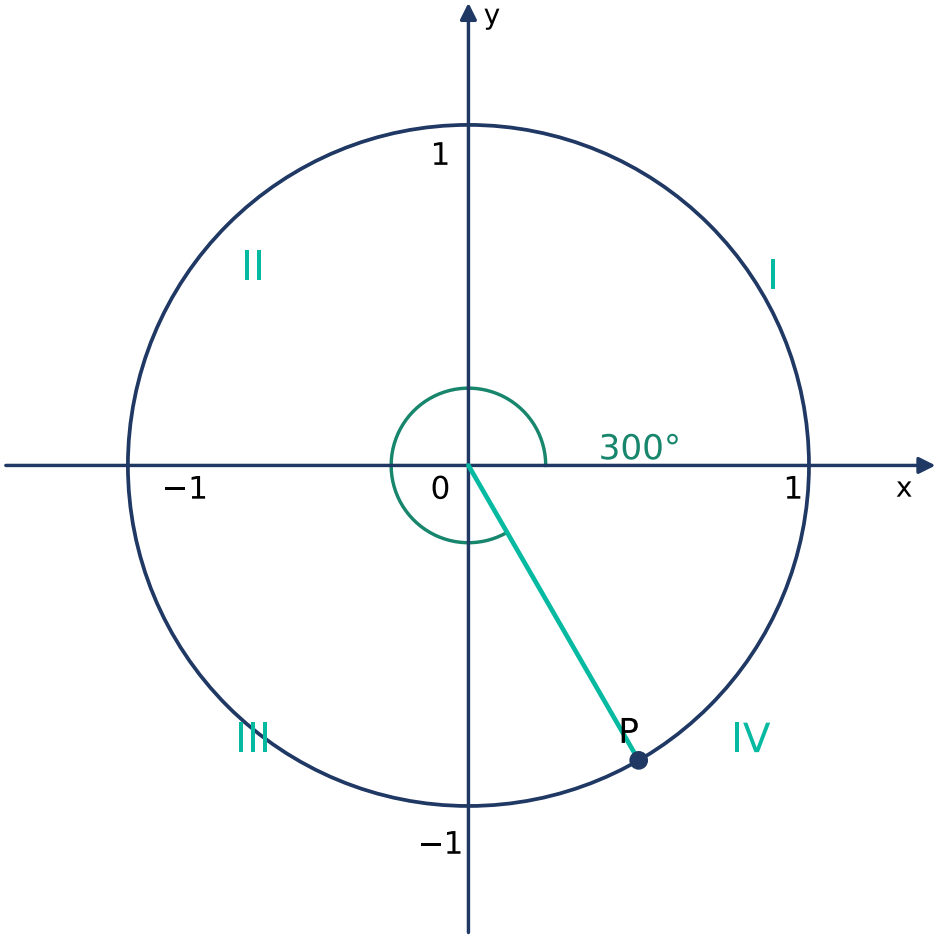
D Quadrant 4

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10 **A wind blows from 300 degrees. Is tan 300 degrees positive or negative?**



A Positive

B Negative

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ANSWER KEY

1. Positive

2. Negative

3. Positive

4. Negative

5. Negative

6. Negative

7. Quadrant 2

8. Quadrant 4

9. Quadrant 1

10. Negative

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