Topic: Quadrant of the angle

Question: Which two axes make up the boundary of the third quadrant?

Answer choices:

A The positive horizontal axis and the negative vertical axis

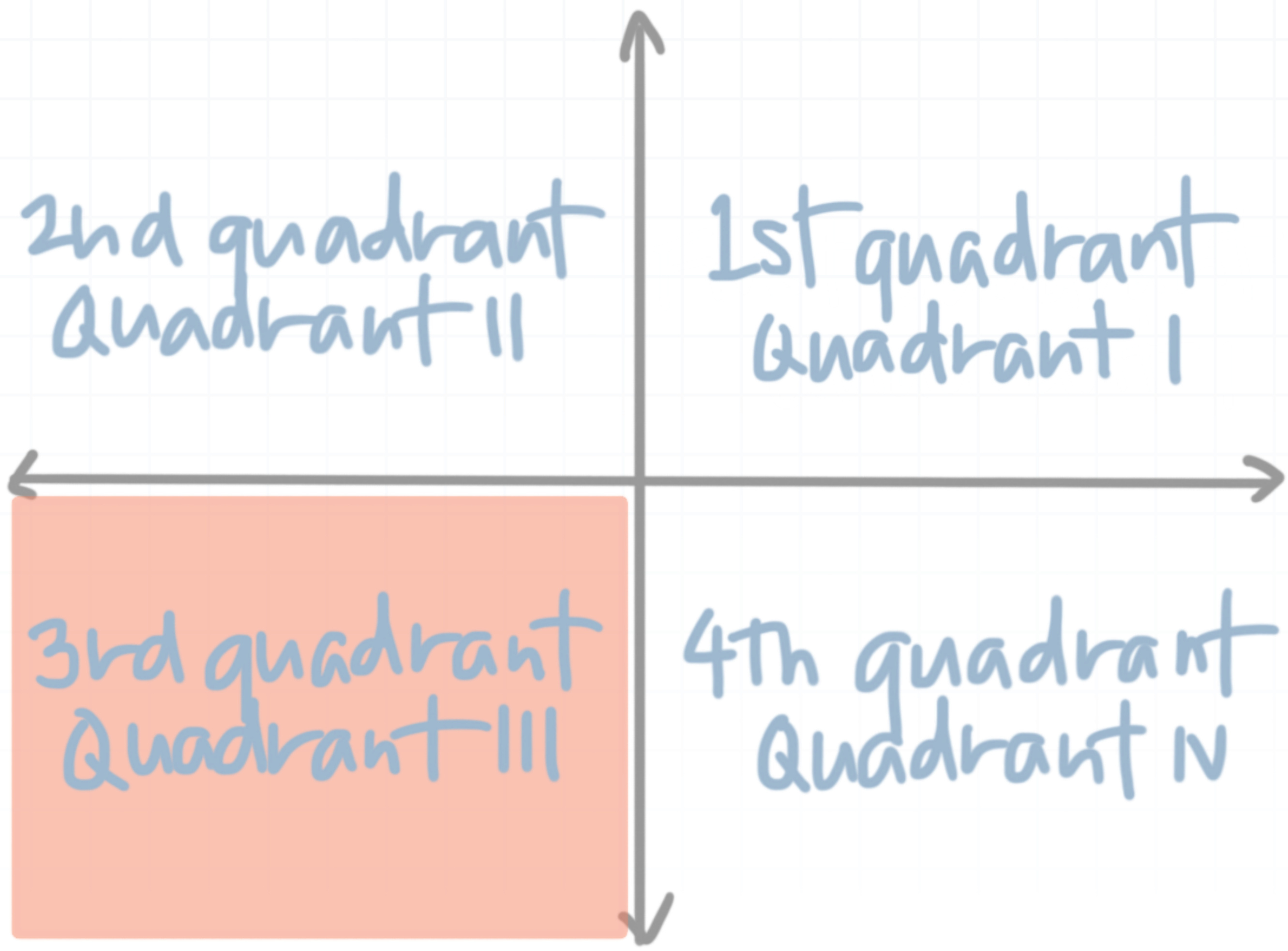
B The negative horizontal axis and the negative vertical axis

C The positive horizontal axis and the positive vertical axis

D The negative horizontal axis and the positive vertical axis

Solution: B

As shown in the shaded region of the figure, the third quadrant is bounded by the negative horizontal axis and the negative vertical axis.



Topic: Quadrant of the angle

Question: In which quadrant is the angle located?

$$-1,600^\circ$$

Answer choices:

A First quadrant

B Second quadrant

C Third quadrant

D Fourth quadrant

Solution: C

To answer this question, we can use our tried-and-true method of finding an angle in the range 0° to 360° that differs from an angle of $-1{,}600^\circ$ by some integer multiple of 360°.

Since the given angle is negative, we need to add positive integer multiples of 360° to $-1{,}600^\circ$ to find such an angle.

$$-1{,}600^\circ + 360^\circ = -1{,}240^\circ$$

$$-1{,}600^\circ + 2(360^\circ) = -1{,}240^\circ + 360^\circ = -880^\circ$$

$$-1{,}600^\circ + 3(360^\circ) = -880^\circ + 360^\circ = -520^\circ$$

$$-1{,}600^\circ + 4(360^\circ) = -520^\circ + 360^\circ = -160^\circ$$

$$-1{,}600^\circ + 5(360^\circ) = -160^\circ + 360^\circ = 200^\circ$$

Note that 200° is in the range 0° to 360°; in particular,

$$180^\circ < 200^\circ < 270^\circ$$

An angle of 180° is on the negative horizontal axis, and an angle of 270° is on the negative vertical axis. Thus an angle of 200° is in the third quadrant. Since $-1{,}600^\circ$ differs from 200° by an integer multiple of 360°, an angle of $-1{,}600^\circ$ is also in the third quadrant.

Topic: Quadrant of the angle

Question: Where is the angle located?

10.5π radians

Answer choices:

A On the positive vertical axis

B On the negative vertical axis

C In the second quadrant

D In the fourth quadrant

Solution: A

First, note that

$$10.5\pi = \left(10\frac{1}{2}\right)\pi = \frac{21}{2}\pi$$

An angle of $(21/2)\pi$ radians isn't in the range 0 to 2π. Since it's a positive angle, we can subtract positive integer multiples of 2π from $(21/2)\pi$ until we find an angle that's in the range 0 to 2π radians.

$$\frac{21}{2}\pi - 2\pi = \frac{21}{2}\pi - \frac{4}{2}\pi = \frac{17}{2}\pi$$

$$\frac{21}{2}\pi - 2(2\pi) = \frac{17}{2}\pi - 2\pi = \frac{17}{2}\pi - \frac{4}{2}\pi = \frac{13}{2}\pi$$

$$\frac{21}{2}\pi - 3(2\pi) = \frac{13}{2}\pi - 2\pi = \frac{13}{2}\pi - \frac{4}{2}\pi = \frac{9}{2}\pi$$

$$\frac{21}{2}\pi - 4(2\pi) = \frac{9}{2}\pi - 2\pi = \frac{9}{2}\pi - \frac{4}{2}\pi = \frac{5}{2}\pi$$

$$\frac{21}{2}\pi - 5(2\pi) = \frac{5}{2}\pi - 2\pi = \frac{5}{2}\pi - \frac{4}{2}\pi = \frac{1}{2}\pi$$

An angle of $(1/2)\pi$ radians is on the positive vertical axis. Since 10.5π differs from $(1/2)\pi$ by an integer multiple of 2π, an angle of 10.5π radians is also on the positive vertical axis.