CHAPTER 5.1

Angle Measure

Multiple-Choice Old Exam Questions

51 questions • 3 topics • options A–E • two questions per page

Topic 1 | Arc Length and Central Angles

Using $s = r\theta$ to find an arc length, a radius or a central angle, including figures with gears and circles • Questions 1–18

Q **1**

The length of the arc intercepted by a central angle of $210°$ in a circle of radius 6 cm is

A) 7π cm

B) $\frac{7\pi}{2}$ cm

C) 630 cm

D) $\frac{\pi}{2}$ cm

E) $\frac{7}{2}$ cm

Q **2**

If an arc subtends a central angle of measure $60°$ in a circle with radius 5 cm, then the arc length is

A) $\frac{5\pi}{6}$ cm

B) $\frac{5\pi}{3}$ cm

C) $\frac{5\pi}{4}$ cm

D) $\frac{\pi}{3}$ cm

E) $\frac{10\pi}{3}$ cm

Q
3

The length of the arc intercepted by a central angle of measure $30°$ in a circle of diameter 72 cm is

A) 12π cm

B) 6π cm

C) 36π cm

D) 1080 cm

E) 6 cm

Q
4

The length of the arc intercepted by a central angle of measure $144°$ of a circle of diameter 40 cm is

A) 16π cm

B) 20π cm

C) 48π cm

D) 32π cm

E) 2880 cm

Q
5

The length of an arc intercepted by a central angle $135°$ in a circle of radius 2π cm is

A) $\frac{3\pi^2}{2}$ cm

B) $\frac{3\pi}{2}$ cm

C) $\frac{3}{8}$ cm

D) $\frac{3}{2}$ cm

E) $\frac{8\pi^2}{3}$ cm

Q
6

The length of the arc intercepted by a central angle $330°$ of a circle of radius 12 cm is

A) 22π cm

B) 3960 cm

C) 396 cm

D) 18π cm

E) 17π cm

Q
7

The length of an arc that subtends a central angle of $80°$ in a circle of diameter 20 cm is equal to

A) $\frac{80\pi}{9}$ cm

B) $\frac{29\pi}{3}$ cm

C) 800 cm

D) $\frac{\pi}{4}$ cm

E) $\frac{40\pi}{9}$ cm

Q
8

A circular arc has length 10π cm and subtends a central angle of $150°$. If another arc of the same circle subtends a central angle of $210°$, then its length is equal to

A) 14π cm

B) 16π cm

C) 18π cm

D) $\frac{28\pi}{3}$ cm

E) $\frac{42\pi}{5}$ cm

Q
9

An arc of length 150 m subtends a central angle of $300°$ in a circle of radius r. The radius r is equal to

A) $\frac{90}{\pi}$ m

B) $\frac{1}{2}$ m

C) $\frac{\pi}{90}$ m

D) $\frac{180}{\pi}$ m

E) 2500π m

Q
10

If the arc length 14π cm makes an angle $315°$ in a circle, then the radius of the circle is

A) 8 cm

B) 16 cm

C) 24 cm

D) $\frac{49\pi^2}{2}$ cm

E) $\frac{56}{5}$ cm

Q
11

If a 100π centimeters arc length subtends a $240°$ central angle in a circle of radius r, then the radius r in centimeters is

A) 75

B) 150

C) 300

D) $\frac{12\pi}{5}$

E) $\frac{5\pi}{12}$

Q
12

In a circle of radius r, an arc length of 10π centimeters is intercepted by a central angle $200°$. Then r is equal to:

A) 9 centimeters

B) $\frac{10}{9}$ centimeters

C) 9π centimeters

D) $\frac{9\pi}{10}$ centimeters

E) $\frac{100}{9}$ centimeters

Q
13

The arc length of 200π cm subtends a central angle of $300°$ in a circle of radius r. The radius r is equal to

A) 120 cm

B) $\frac{2\pi}{3}$ cm

C) 180 cm

D) 150 cm

E) $\frac{3}{2\pi}$ cm

Q
14

If a 12π cm arc length subtends a central angle of measure $40°$ in a circle with radius r cm, then $r =$

A) 54

B) 36

C) 24

D) 12

E) 72

Q
15

If the arc length 21π cm makes a central angle of $315°$ in a circle, then the radius of the circle is

A) 12 cm

B) 16 cm

C) 24 cm

D) $\frac{7\pi}{105}$ cm

E) $\frac{84}{5}$ cm

Q
16

If an arc of length $\frac{16\pi}{3}$ cm subtends a central angle of measure $\theta°$ in a circle with diameter 24 cm, then $\theta =$

A) 80

B) 40

C) 20

D) 160

E) 240

Q
17

In the adjacent figure, if the smaller gear rotates through an angle of $225°$, then the angle through which the larger gear rotates is equal to:

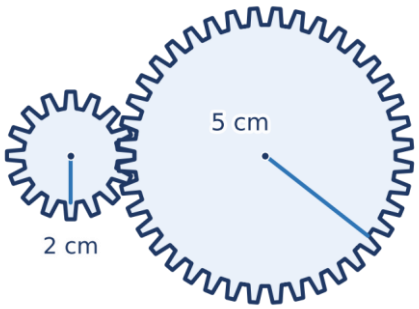
A) $\frac{\pi}{2}$

B) $\frac{25\pi}{8}$

C) $270°$

D) $135°$

E) $180°$



Q
18

In the adjacent figure, the arc length $AB =$

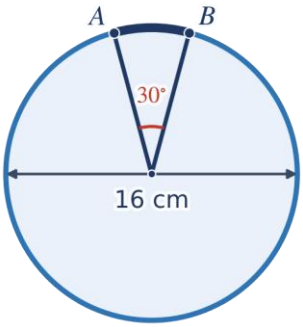
A) $\frac{4\pi}{3}$ cm

B) $\frac{8\pi}{3}$ cm

C) 480 cm

D) $\frac{2\pi}{3}$ cm

E) 240 cm



Topic 2 | Angle Measure: Quadrants and Coterminal Angles

Converting between radians and degrees, locating angles in standard position, and finding or recognising coterminal angles • Questions 19–32

Q **19**

If $\alpha = 575°$ and $\theta = -\frac{11\pi}{6}$ are two angles in standard position, then which one of the following statements is TRUE about the locations of α and θ?

A) α is a Quadrant III angle and θ is a Quadrant IV angle

B) α is a Quadrant II angle and θ is a Quadrant IV angle

C) α is a Quadrant IV angle and θ is a Quadrant III angle

D) α is a Quadrant III angle and θ is a Quadrant I angle

E) α is a Quadrant I angle and θ is a Quadrant II angle

Q **20**

The value of $\theta = \frac{11\pi}{15}$ in degrees is equal to:

A) $132°$

B) $135°$

C) $137°$

D) $138°$

E) $139°$

Q
21

If $\alpha = 475°$ and $\beta = -\frac{11\pi}{6}$ are two angles in standard position, then $2\alpha + \beta$ is in the

A) third quadrant

B) first quadrant

C) second quadrant

D) fourth quadrant

E) quadrantal angle

Q
22

If x is the largest negative angle coterminal with $\alpha = -975°$ and y is the largest negative angle coterminal with $\beta = 75°$, then $x - y =$

A) $30°$

B) $60°$

C) $-180°$

D) $-60°$

E) $-135°$

Q
23

The greatest negative angle that is coterminal with $\frac{27\pi}{5}$ is

A) $-\frac{3\pi}{5}$

B) $-\pi$

C) $-\frac{2\pi}{5}$

D) $-\frac{4\pi}{5}$

E) $-\frac{\pi}{5}$

Q
24

Which one of the following angles is NOT coterminal with $361°$?

A) $-721°$

B) $-359°$

C) $1°$

D) $-1079°$

E) $1081°$

Q
25

Which one of the following angles is NOT coterminal with $60°$?

A) $-240°$

B) $420°$

C) $-300°$

D) $780°$

E) $-660°$

Q
26

Which one of the following angles is coterminal with the angle $777°$?

A) $-663°$

B) $50°$

C) $-50°$

D) $-203°$

E) $47°$

Q
27

Which one of the following angles is NOT coterminal with $55°$?

A) $235°$

B) $415°$

C) $-305°$

D) $775°$

E) $-665°$

Q
28

Which one of the following angles is NOT coterminal with $-361°$?

A) $1°$

B) $-1°$

C) $359°$

D) $-721°$

E) $-1081°$

Q
29

If $x°$ is a positive angle in standard position, which one of the following angles is coterminal with $x°$?

A) $x° - 360°$

B) $x° - 90°$

C) $x° + 90°$

D) $360° - x°$

E) $x° + 180°$

Q
30

If $\alpha = \theta + 45°$, then which one of the following angles is NOT coterminal with θ?

A) $\alpha - 235°$

B) $\alpha + 315°$

C) $\alpha - 405°$

D) $\alpha + 675°$

E) $\alpha - 765°$

Q
31

Which one of the following angles is NOT coterminal with $50°$?

A) $310°$

B) $410°$

C) $-310°$

D) $770°$

E) $-670°$

Q
32

If the point P moves around the circumference of a unit circle at an angular speed of 1 rad/sec, then the time it takes P to complete one rotation on the circle is:

A) 2π sec

B) π sec

C) 1 sec

D) $\frac{1}{\pi}$ sec

E) $\frac{\pi}{2}$ sec

Topic 3 | Angular Speed and Linear Speed

Revolutions, angles turned, and the relations $v = r\omega$ and $\omega = \vartheta/t$ in applications • Questions 33–51

Q **33**

A tire rotates 240 times per minute. Through how many degrees does a point on the edge of the tire move in $\frac{1}{2}$ second?

A) $720°$

B) $1040°$

C) $1440°$

D) $180°$

E) $360°$

Q **34**

A tire is rotating 600 times per minute. Through how many degrees does a point on the edge of the tire move in 0.25 sec?

A) $900°$

B) $800°$

C) $700°$

D) $600°$

E) $500°$

Q
35

Each wheel on a bicycle has a radius of 30 centimeters. If the wheels are rotating at 150 revolutions per minute, then the linear speed of the bicycle in meters per second is

A) 0.45π m/s

B) 4.5π m/s

C) 1.5π m/s

D) $\frac{5\pi}{3}$ m/s

E) 0.15π m/s

Q
36

The wheels of a car have radius 9 inches and are rotating at 300 revolutions per minute. The speed of the car in inches per second is

A) 150π

B) 45π

C) 90π

D) 900π

E) 180π

Q
37

The linear speed of a compact disc is 30π feet per minute. If the diameter of the disc is 10 feet, then the angular speed of the disc in revolutions per minute is

A) 3

B) 4

C) 6

D) 5

E) 2

Q
38

If the tires on a bicycle with radius 18 centimeters are rotating at 240 revolutions per minute, then the speed of the bicycle in centimeters per second is

A) 144π

B) 72π

C) 8π

D) 216π

E) 288π

Q
39

If a car is moving along a circular path of radius 2 kilometers and making $\frac{1}{4}$ revolution per minute, then the distance traveled by the car in kilometers along the path in 3 hours is

A) 180π

B) 240π

C) 60π

D) 120π

E) 300π

Q
40

The tires of a car have diameter 40 centimeters and are turning 5 times per second. How fast is the car traveling in centimeters per minute?

A) 12000π

B) 4000π

C) 5000π

D) 8400π

E) 2000π

Q
41

A pulley has a radius of 10 centimeters. If it takes 20 seconds for 60 centimeters of the belt to go around the pulley, then the angular speed of the pulley in radians per second is equal to:

A) 0.3

B) 3

C) $\frac{10}{3}$

D) $\frac{1}{120}$

E) 120

Q
42

A wheel has a radius of 25 feet. If it takes the wheel 30 seconds to turn $150°$, then the angular speed of the wheel is:

A) $\frac{\pi}{36}$ radian/sec

B) $\frac{\pi}{360}$ radian/sec

C) $\frac{75\pi}{3}$ radian/sec

D) $\frac{\pi}{30}$ radian/sec

E) $\frac{125\pi}{6}$ radian/sec

Q
43

Each tire of a car has a radius of 40 cm. If the tires are rotating at 500 revolutions per minute, then the speed of the car in kilometers per hour is: $(1 \text{ km} = 10^5 \text{ cm})$

A) 24π

B) 150

C) 30π

D) $\frac{51}{2}\pi$

E) 19π

Q
44

If a point on the edge of a circle with radius 30 cm is rotating with angular speed of $\frac{\pi}{10}$ radian per second, then the distance traveled by the point in 45 seconds is

A) 135π cm

B) 150π cm

C) 180π cm

D) 90π cm

E) 145π cm

Q
45

If the tires on a car have diameter 36 cm and are rotating at 70 revolutions per minute, then the speed of the car in cm per second is equal to:

A) 42π

B) 21π

C) 84π

D) 1260

E) 2520

Q
46

Suppose that a point P is on the edge of a circle with diameter 20 cm, and P is rotating with angular speed of $\frac{\pi}{18}$ radian per second. The distance traveled by P in 6 seconds is

A) $\frac{10\pi}{3}$ cm

B) $\frac{20\pi}{3}$ cm

C) 10π cm

D) $\frac{10\pi}{7}$ cm

E) $\frac{10\pi}{9}$ cm

Q
47

A point on the edge of a disc is 6 feet from the center. If the disc is rotating at 5 revolutions per minute, then the linear speed in feet per minute is

A) 60π

B) 30

C) 30π

D) 120π

E) 120

Q
48

A belt runs a pulley of radius 9 centimeters at 80 revolutions per minute. Then the linear speed of the belt in centimeters per second is

A) 24π

B) 1440π

C) 720

D) $\frac{6}{\pi}$

E) $\frac{360}{\pi}$

Q
49

The two pulleys in the figure have radii 15 cm and 8 cm respectively. If the larger pulley rotates 120 times in a minute, then the angular speed of the smaller pulley in radians per second is

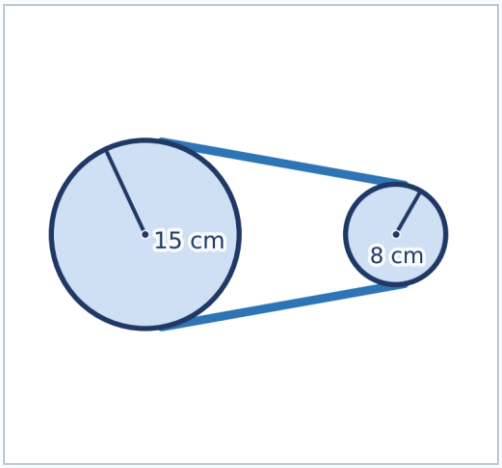
A) $\frac{15\pi}{2}$

B) $\frac{13\pi}{4}$

C) $\frac{25\pi}{4}$

D) 5π

E) 15π



Q
50

The wheels of a car have radius 30 cm and are rotating at 250 rev/min. Then the distance (in km) run by the car in 30 minutes is equal to

A) $\frac{450}{\pi}$ km

B) 15π km

C) 7.5π km

D) 4.5π km

E) 0.05π km

Q
51

If a scooter with 10 cm radius tires moves 4800π cm per minute, then the number of revolutions per second the scooter's tires are making is

A) 4

B) 8

C) 2

D) 40

E) 80

Answer Key

"Original" shows the question number in the source worksheet.

Q	Original	Ans.	Value
1	2	**A**	7π cm
2	4	**B**	$\frac{5\pi}{3}$ cm
3	5	**B**	6π cm
4	6	**A**	16π cm
5	10	**A**	$\frac{3\pi^2}{2}$ cm
6	14	**A**	22π cm
7	16	**E**	$\frac{40\pi}{9}$ cm
8	52	**A**	14π cm
9	1	**A**	$\frac{90}{\pi}$ m
10	3	**A**	8 cm
11	8	**A**	75
12	9	**A**	9 centimeters
13	12	**A**	120 cm
14	15	**A**	54
15	17	**A**	12 cm
16	7	**A**	80
17	13	**A**	$\frac{\pi}{2}$
18	18	**A**	$\frac{4\pi}{3}$ cm
19	19	**D**	α is a Quadrant III angle and θ is a Quadrant I angle
20	20	**A**	$132°$
21	24	**A**	third quadrant
22	22	**A**	$30°$
23	25	**A**	$-\frac{3\pi}{5}$
24	23	**A**	$-721°$
25	26	**A**	$-240°$
26	27	**A**	$-663°$
27	28	**A**	$235°$
28	29	**A**	$1°$
29	30	**A**	$x° - 360°$
30	31	**A**	$\alpha - 235°$
31	32	**A**	$310°$
32	42	**A**	2π sec
33	11	**A**	$720°$
34	36	**A**	$900°$
35	33	**C**	1.5π m/s

Q	Original	Ans.	Value
36	34	**C**	90π
37	35	**A**	3
38	37	**A**	144π
39	38	**A**	180π
40	39	**A**	12000π
41	40	**A**	0.3
42	41	**A**	$\frac{\pi}{36}$ radian/sec
43	43	**A**	24π
44	44	**A**	135π cm
45	45	**A**	42π
46	46	**A**	$\frac{10\pi}{3}$ cm
47	47	**A**	60π
48	48	**A**	24π
49	49	**A**	$\frac{15\pi}{2}$
50	50	**D**	4.5π km
51	51	**A**	4