

Trigonometry- Arc Length, Angular Speed, Linear Speed

SHORT ANSWER. Write the word or phrase that best completes each statement or answers the question.

Find the length of the arc intercepted by the given central angle α in a circle of radius r .

1) $\alpha = 2.50$, $r = 18.15$ cm 1) _____

2) $\alpha = \frac{2\pi}{3}$, $r = 6.3$ m 2) _____

3) $\alpha = \frac{9\pi}{5}$, $r = 0.934$ mm 3) _____

Find the radius of a circle with central angle α intercepting an arc of length s .

4) $\alpha = 1.5$ radians, $s = 27$ in. 4) _____

5) $\alpha = 2.5$ radians, $s = 15$ in. 5) _____

Find the area of a sector with the given central angle α in a circle of radius r .

6) $\alpha = 2$, $r = 10$ inches 6) _____

7) $\alpha = \frac{\pi}{2}$, $r = 10$ cm 7) _____

8) $\alpha = 90^\circ$, $r = 4$ cm 8) _____

Solve the problem.

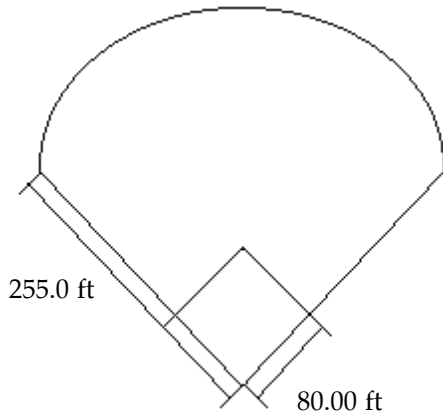
9) On a flywheel with a 65.7-mm radius, how long is an arc subtended by a central angle of 328° ? 9) _____

10) Two wheels are rotating in such a way that the rotation of the smaller wheel causes the larger wheel to rotate. The radius of the smaller wheel is 3.0 centimeters and the radius of the larger wheel is 13.3 centimeters. Through how many degrees will the larger wheel rotate if the smaller one rotates 53° ? 10) _____

11) The minute hand of a clock is 6 inches long. What distance does its tip move in 16 minutes? 11) _____

- 12) The city park district is planning on sodding the outfield of the little league baseball field. The distance from home plate to the outer edge of the infield is 80.00 ft. The angle between the outer edge of the first and third baselines is 90° , and the radius of the sector is 255.0 ft. Determine the area of the outfield.

12) _____



- 13) A sensor light installed on the edge of a home can detect motion for a distance of 50 ft. in front and with a range of motion of 192° . Over what area will the sensor detect motion and become illuminated? Round to two decimal places.

13) _____

Find the product. Be sure to indicate the units for the answer. Round approximate answers to the nearest tenth.

14) $\frac{20 \text{ rad}}{30 \text{ sec}} \cdot \frac{3600 \text{ sec}}{1 \text{ hr}}$

14) _____

15) $\frac{1603 \text{ rev}}{9 \text{ min}} \cdot \frac{14 \text{ in}}{1 \text{ rev}} \cdot \frac{1 \text{ ft}}{12 \text{ in}}$

15) _____

Solve.

- 16) An engine is "turning over" at an angular velocity of 2400 rpm. Express this angular velocity in rad/min.

16) _____

- 17) Express the angular velocity of 900 rad/sec in rev/sec (to the nearest hundredth).

17) _____

Solve the problem.

- 18) Two pulleys of diameter 9 m and 3 m are connected by a belt. The larger pulley rotates 36 times per min. Find the angular velocity of the smaller pulley.

18) _____

- 19) A pulley of radius 7 cm rotates 15 times in 128 sec. Find the angular velocity of the pulley.

19) _____

- 20) A wheel is rotating at 3 radians/sec, and the wheel has a 80-inch diameter. To the nearest foot per minute, what is the linear velocity of a point on the rim?

20) _____

- 21) A wheel with a 22-inch diameter is turning at the rate of 46 revolutions per minute. To the nearest inch per minute, what is the linear velocity of a point on the rim?

21) _____

22) A satellite in a circular orbit 879.4 mi above the earth makes one complete orbit every 83.42 min. What is its linear velocity? Use 3963 mi for the length of the radius of the earth. 22) _____

23) A pulley with a diameter of 27 inches is driven by a belt which is moving 857 ft/min. To the nearest unit, how many revolutions per minute are made by the pulley? 23) _____

Answer Key

Testname: TRIG-ARC, ANGULAR, LINEAR

- 1) 45.375 cm
- 2) 13.2 m
- 3) 5.282 mm
- 4) 18 in.
- 5) 6 in.
- 6) 100 sq in.
- 7) 25π sq cm
- 8) 4π sq cm
- 9) 376 mm
- 10) 11.95°
- 11) $\frac{16}{5}\pi$ in.
- 12) 44,670 ft²
- 13) 4188.79 ft²
- 14) 2400 rad/hr
- 15) 207.8 ft/min
- 16) 4800π rad/min
- 17) 143.24 rev/s
- 18) 216π radians/min
- 19) $\frac{15\pi}{64}$ radians/sec
- 20) 600 ft/min
- 21) 3179 in./min
- 22) 364.7 mi/min
- 23) 121 rpm