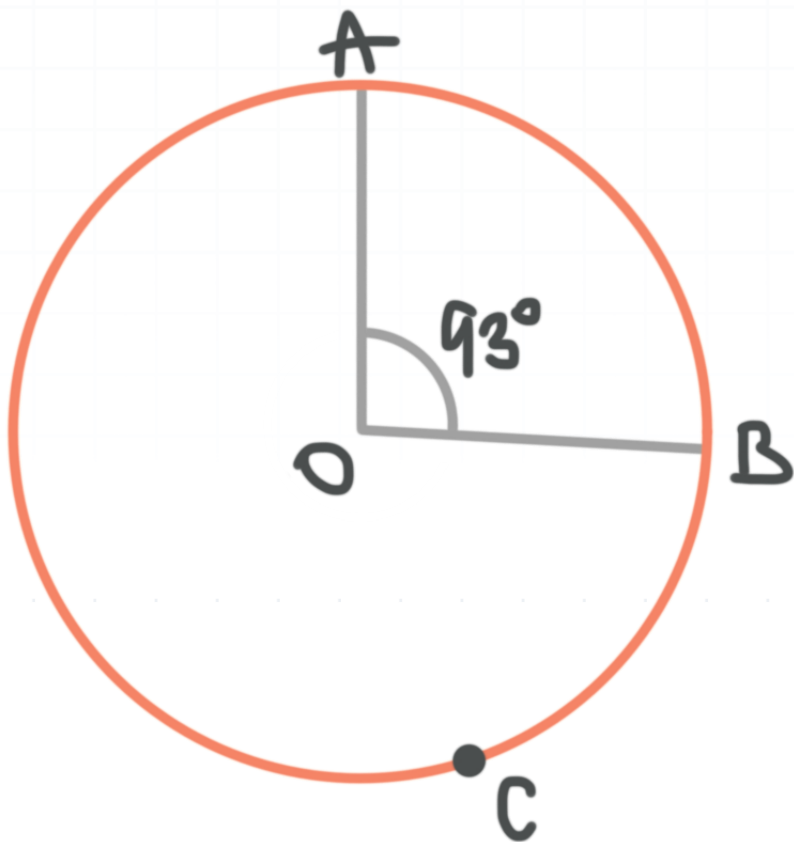# Trigonometry Workbook

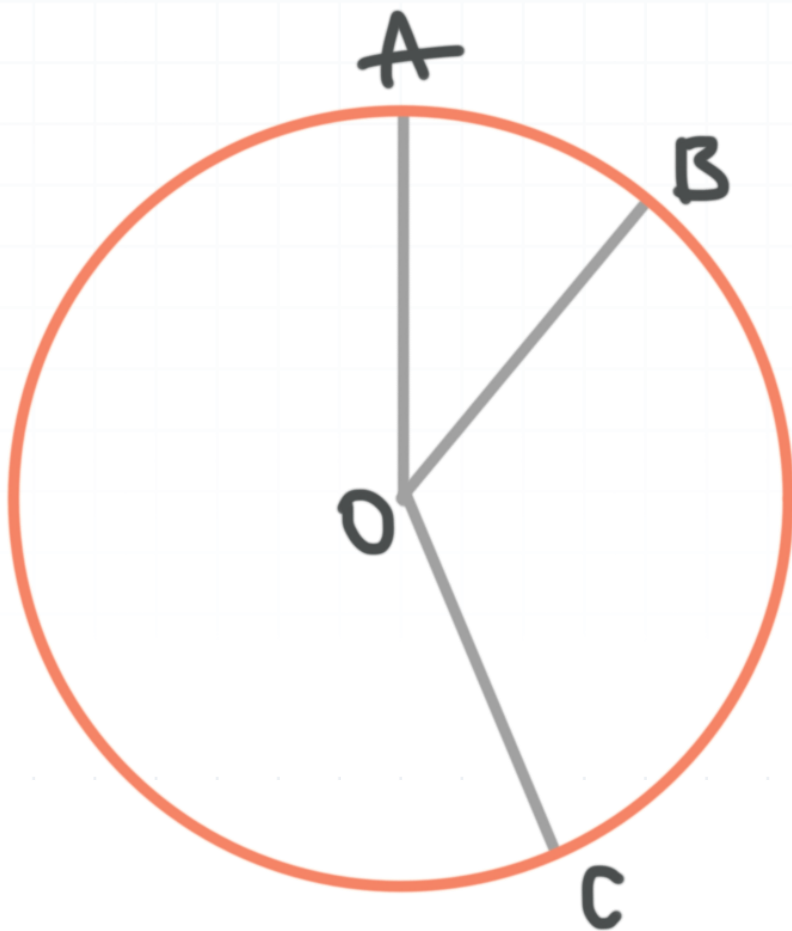Angles in circles

RADIANS AND ARC LENGTH

■ 1. Find the degree measure of the central angle if the length of an arc carved out by this central angle is 9.42 and the radius of the circle is $r = 6$.

■ 2. In circle O, the diameter is 30 cm, and the measure of arc AB is $93°$. Find the length of arc ACB.

■ 3. A circle has a central angle of $35°23'6''$ which subtends an arc of length 3π cm. Find the diameter of the circle to the nearest centimeter.
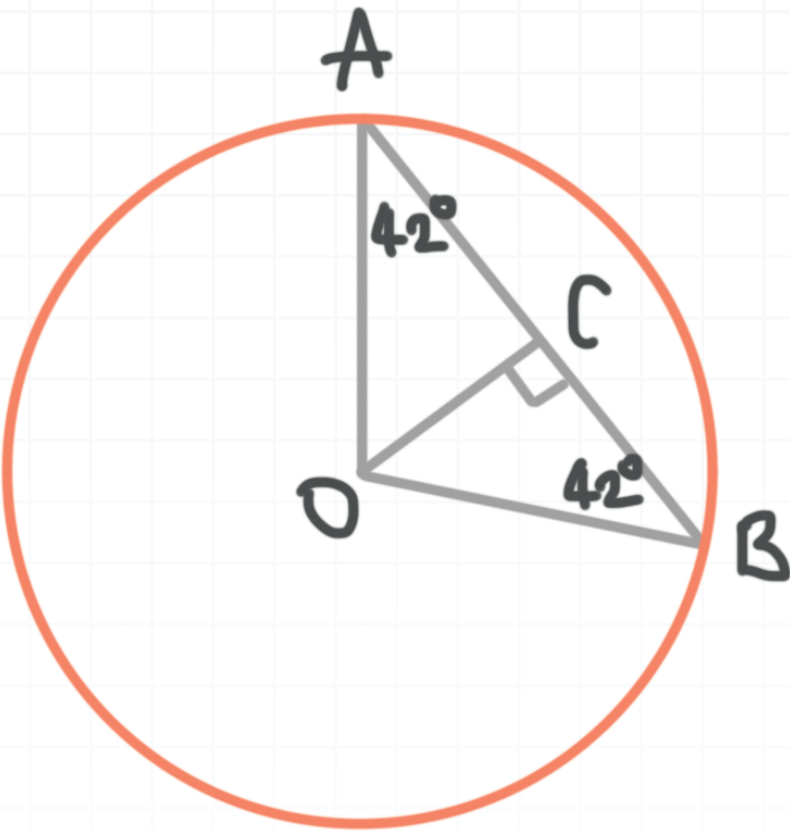
■ 4. A circle has a radius of 19 cm. Find the central angle that subtends an arc of length 47.5 cm, rounding the answer to the nearest second.

■ 5. If AOB is a central angle of $53°$, the angle $BOC = 122°$, and the radius is 9 cm, then find the length of the arc ABC. Use $\pi = 3.14$ and round the answer to one decimal place.
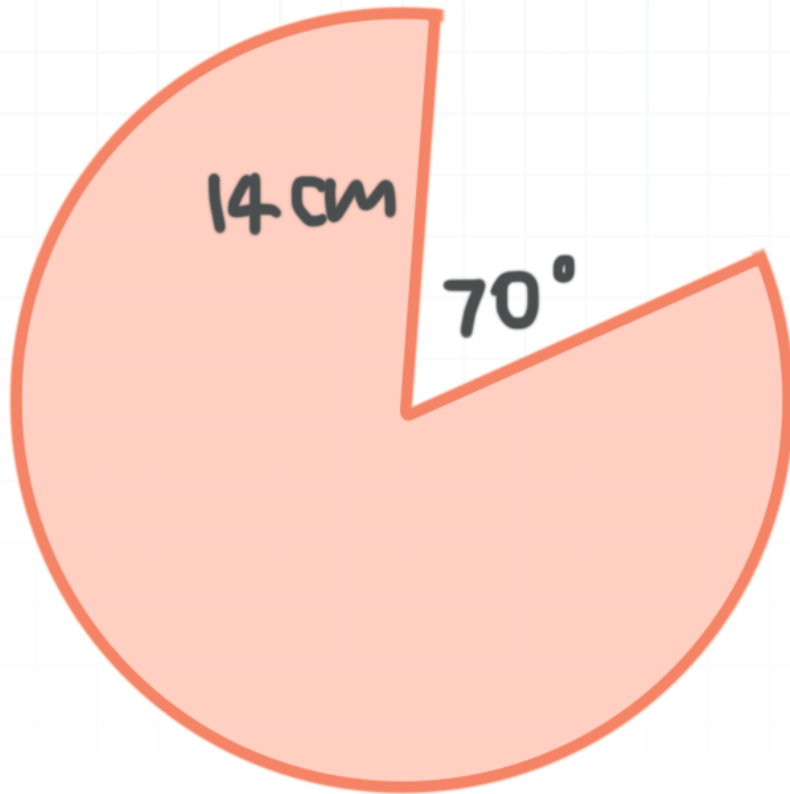

■ 6. Find the length of the arc AB given that the radius of the circle is 12 cm. Round the answer to one decimal place.
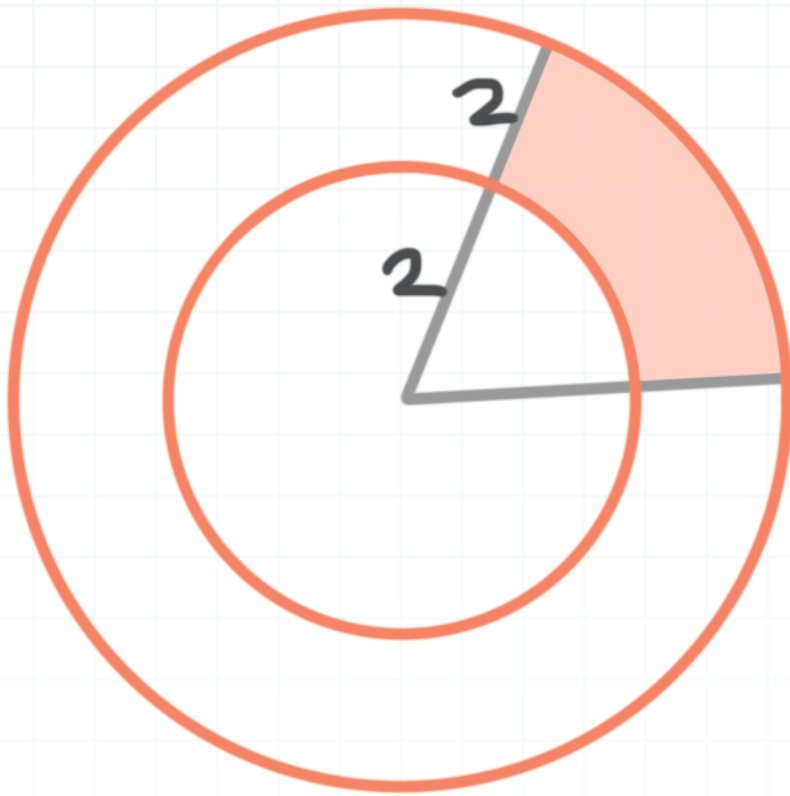
AREA OF A CIRCULAR SECTOR

■ 1. Find the area of the shaded region.

■ 2. Find the area of the shaded region between the concentric circles, if the angle that subtends the arc is $80°$.

■ 3. A circle has radius 13. Find the area A of a sector of the circle that has a central angle of $2\pi/5$.

■ 4. A pizza with 16 inch diameter is sliced into 8 equal slices. Find the area of one of the pizza slices.

■ 5. Find the area of a sector of a circle that has diameter $\overline{GH}$ with $G(-1, -1)$ and $H(5,7)$ if the arc which bounds that sector subtends a central angle of $4\pi/9$. Use the distance formula for d to find the length of the diameter.

$$d = \sqrt{(x_2 - x_1)^2 + (y_2 - y_1)^2}$$

■ 6. The area of a sector of a circle is formed with a central angle $3\pi/4$ and has area 54π. Find the diameter of the circle.

TRIG FUNCTIONS OF REAL NUMBERS

■ 1. Find $\sec 1.56$ using a calculator to evaluate only cosine. Round the result to three decimal places.

■ 2. Find $\cot 0.567$ using a calculator to evaluate only sine and cosine. Round the result to four decimal places.

$$\cot 0.567$$

■ 3. Find the value of all six circular functions at $a = 1.273$ using a calculator to evaluate only sine and cosine.

■ 4. Find the value of all six circular functions at $t = -0.2489$.

■ 5. Find $\tan 3.49$ using a calculator to evaluate only sine and cosine. Round the result to two decimal places.

■ 6. Find the value of all six circular functions at $s = -4.5$, using a calculator to evaluate only sine and cosine.

LINEAR AND ANGULAR VELOCITY

■ 1. What is the angular velocity, in radians per second, of a wheel that rotates at a constant rate and sweeps out an angle of $33\pi/4$ radians in 0.6 seconds?

■ 2. The wind turbine has a circular blade with diameter 154 meters that rotates at 18 rotations per minute. Find the angular velocity of the blade in degrees per second.

■ 3. What is the angular velocity, in radians per second, of a wheel that rotates at a constant rate and sweeps out an angle of $21\pi/5$ radians in 0.85 seconds?

■ 4. Suppose a frisbee rotates at a constant rate of 105 revolutions per minute. What is its angular velocity ω in radians per second?

■ 5. Find angular velocity, in radians per minute, of an object that rotates at a constant rate and sweeps out an angle of $985°$ in 8.4 seconds.

■ 6. A cylinder with a 3.4 ft radius is rotating at 150 rpm. Give the angular velocity in rad/sec and in degrees per second.

RELATING LINEAR AND ANGULAR VELOCITY

■ 1. A saw has a circular blade with diameter 10 inches that rotates at $5,000$ revolutions per minute. Find the approximate linear velocity of the saw teeth (in ft/sec) as they contact the wood being cut.

■ 2. A car's tire has a radius of 12.5 inches and turns with an angular velocity of 84.5 radians per second. Find the approximate linear velocity of the car in miles per hour. (Use the fact that there are 12 inches in 1 foot, and approximately $5,280$ feet in 1 mile.)

■ 3. A bicycle tire with a diameter of 26 inches turns with an angular velocity of 2 radians per seconds. Find the distance traveled in 5 minutes by a point on the tire.

■ 4. A tire with a radius of 0.75 feet is rotating at 36 miles per hour. Find the angular velocity of a point on its rim, expressed in revolutions per minute.

■ 5. The carousel at the county fair makes 3.5 revolutions per minute. The linear speed of a person riding inside the carousel is 2.9 ft/sec. How far is this person from the carousel's center?

■ 6. A disk is spinning at 27 rpm. If a fly is sitting 9 cm from the center of the disk, what is the angular velocity of the fly in radians/sec? What is the speed of the fly in cm/sec? After 2 min, how far has the fly traveled?