Handout Math 48C Mitchell Schoenbrun

M48C/Schoenbrun Section 6.1
Solutions

1) $325^\circ \times \frac{\pi}{180^\circ} = \frac{65\pi}{36}$

2) $60^\circ \times \frac{\pi}{180^\circ} = \frac{\pi}{3}$

3) $\frac{23\pi}{12} \times \frac{180^\circ}{\pi} = 276^\circ$

4) $\frac{10\pi}{3} \times \frac{180^\circ}{\pi} = 600^\circ$

5) $-315^\circ \times \frac{\pi}{180^\circ} = -\frac{7\pi}{4}$

6) $-\frac{\pi}{2} \times \frac{180^\circ}{\pi} = -90^\circ$

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1) $2\pi(11ft) \times \frac{315^\circ}{360^\circ} = \frac{77}{4}\pi ft \approx 60.5ft$

2) $2\pi(13ft) \times \frac{270^\circ}{360^\circ} = \frac{39}{2}\pi ft \approx 61.3ft$

3) $2\pi(16ft) \times \frac{3\pi/2}{2\pi} = 24\pi \approx 75.4ft$

4) $2\pi(13in) \times \frac{\pi/6}{2\pi} = \frac{13}{6}\pi in \approx 6.82in$

5) $2\pi(18cm) \times \frac{60^\circ}{360^\circ} = 6\pi cm \approx 18.8cm$

6) $2\pi(16m) \times \frac{75^\circ}{360^\circ} = \frac{20}{3}\pi m \approx 20.9m$

7) $2\pi(9ft) \times \frac{7\pi/4}{2\pi} = \frac{63}{4}\pi ft \approx 49.5ft$

8) $2\pi(14ft) \times \frac{19\pi/12}{2\pi} = \frac{133}{6}\pi ft \approx 69.6ft$

9) $2\pi(8cm) \times \frac{315^\circ}{360^\circ} = 14\pi cm$

10) $2\pi(19ft) \times \frac{150^\circ}{360^\circ} = \frac{95}{6}\pi ft$

11) $2\pi(14cm) \times \frac{\pi/2}{2\pi} = 7\pi cm$

12) $2\pi(13ft) \times \frac{3\pi/4}{2\pi} = \frac{39}{4}\pi ft$

Part 2

1. A physical therapist is measuring the range of motion of an athlete's knee after knee construction (torn ACL). The athlete can bend it 132^0, but the physical therapist wants him to acquire a full range of motion, 180^0.

(a) How many degrees of motion does the athlete have to recover?

$180^\circ - 132^\circ = 48^\circ$

(b) If the athlete recovers at 4^0 per week, how long will rehabilitation take?

$$\frac{48^\circ}{4^\circ / wk} = 12wk$$

2. 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 6.9 cm and the radius of the larger wheel is 10.9 cm. Through how many degrees will the larger wheel rotate if the smaller one rotates 108°?

$108^\circ \times \frac{\pi}{180^\circ} \times 6.9cm$ is the length of the arc that both wheels travel through.

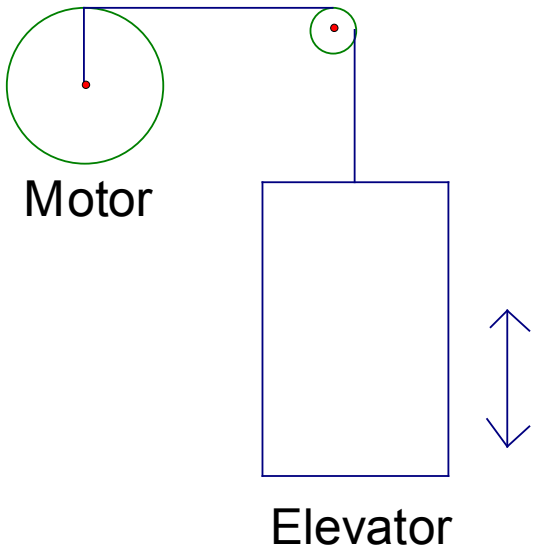
$\frac{108^\circ \times \frac{\pi}{180^\circ} \times 6.9cm}{10.9cm}$ is the number of radians the large wheel will move through

So $\frac{108^\circ \times \frac{\pi}{180^\circ} \times 6.9cm}{10.9cm} \times \frac{180^\circ}{\pi} \approx 68.4^\circ$ is the number of degrees the large wheel will move through

3. The diameter of a pizza is 12 inches and the pizza has been cut into 8 slices. Assuming that the pizza has been cut evenly, what is the length of the crust for each slice of pizza?

$$\frac{\pi(12in)}{8} = \frac{3\pi}{2} in \approx 4.7in$$

Part 4
Problem 1)

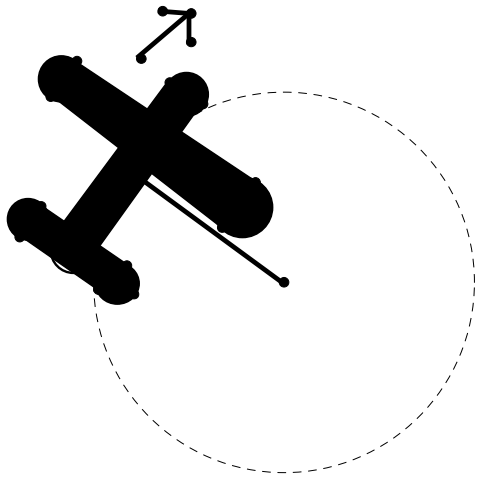


The motor cylinder is 1 meter in diameter.
The motor can move the elevator up at 8 RPM or down at 18 RPM
What are the up and down speeds of the elevator?

$8\ rpm = 16\pi\ rad/\min \quad 18\ rpm = 36\pi\ rad/\min$

$V_{up} = 16\pi \times 1m = 16\pi\ m/\sec \quad V_{down} = 36\pi \times 1m = 36\pi\ m/\sec$

Problem 2)



A toy Airplane flies at 4meters/second. It is held by a string that is 5 meters in length.
What is it's angular velocity in radians/sec and RPM?

$$\frac{4\ m/\sec}{5\,m} = \frac{4}{5} rad/\sec \qquad \frac{\frac{4}{5} rad/\sec}{2\pi} \times 60\ \min/\sec = \frac{24}{\pi} rpm$$