Problems

1. Convert the following degrees to radian measure.

   (a) $30°$

   (b) $60°$

   (c) $90°$

   (d) $270°$

   (e) $260°$

   (f) $340°$

   (g) $-150°$

   (h) $420°$

2. Convert the following radians to degree measure.

   (a) $\frac{\pi}{3}$

   (b) $\frac{\pi}{4}$

   (c) $\frac{2\pi}{3}$

   (d) $\frac{3\pi}{4}$

   (e) $-\frac{7\pi}{6}$

   (f) $\frac{10\pi}{6}$

   (g) 4π

   (h) $\frac{\pi}{12}$

3. $sin\theta = \frac{3}{5}$, and $0 < \theta < 180$ find:

   (a) $cos\theta$

   (b) $sin2\theta$

   (c) $cos2\theta$

   (d) $sin\frac{\theta}{2}$

   (e) $cos\frac{\theta}{2}$

4. $cos\theta = \frac{1}{2}$, $270 < \theta < 360$ find:

   (a) $sin\theta$

   (b) $cos2\theta$

   (c) $sin2\theta$

   (d) $cos\frac{\theta}{2}$

   (e) $sin\frac{\theta}{2}$

5. Find specified angle or length of triangle ABC if:

(a) Find angle opposite the side with length 30. $A = 60°$, $b = 20$, $c = 30$

(b) Find angle opposite the side with length 20. $a = 34$, $b = 20$, $c = 18$

(c) Find the largest angle: $a = 38$, $b = 24$, $c = 31$

(d) Find all missing sides and angles: $a = 410$, $c = 340$, $B = 151.5°$

(e) Find all missing sides and angles: $a = 0.48$, $b = 0.63$, $c = 0.75$

6. Find A, θ such that $49\sin\theta + 18\cos\theta = A\sin(\theta + \alpha)$.

7. Solve the following train problems.

(a) A train leaves Austin for a nearby city at 2:15 am, averaging 80 mph. Another train leaves the nearby city for Austin at 3:30 am, averaging 110 mph. If the nearby city is 2855 miles from Austin, to the nearest minute, at what time will the two trains pass each other?

(b) A train leaves Los Angeles at 6:45 pm, averaging 85 mph. Another train headed in the same direction leaves Los Angeles at 9:30 pm, averaging 105 mph. To the nearest minute, at what time will the second train overtake the first train?

(c) A train leaves Rome at 7:15 am, averaging 95 mph. Another train headed in the opposite direction leaves Rome at 8:30 am, averaging 115 mph. To the nearest mile, how far are the two trains from each other at 10:30 am?

(d) A train leaves Barcelona at 9:45 am, averaging 85 mph. Another train headed in the opposite direction leaves Barcelona at 12:15 pm, averaging 95 mph. To the nearest mile, how far are the two trains from each other at 1:15 pm?

(e) A train leaves Barcelona at 3:15 am, averaging 30 mph. Another train headed in the opposite direction leaves Barcelona at 4:45 am, averaging 41 mph. To the nearest mile, how far are the two trains from each other at 5:45 am?

8. Solve the following rate of work problems.

(a) Worker A can finish a job in 3 hours. When working at the same time as Worker B, they can finish the job in 2 hours. How long does it take for Worker B to finish the job if he works alone?

(b) Painters A and B can paint a wall in 10 hours when working at the same time. Painter B works twice as fast as A. How long would it take to each of them to paint it if they worked alone?

(c) A 10,000 litre pool is filled by two pipes: A and B. Pipe A delivers 1,000 litres per hour. When pipe A and B are both on, they can fill this pool in 4 hours. How many litres per hour can pipe B deliver?

Selected Answers

1. (a) $\frac{\pi}{6}$ (c) $\frac{\pi}{2}$ (e) $\frac{13\pi}{9}$ (g) $-\frac{5\pi}{6}$ (h) $\frac{7\pi}{3}$

2. (a) $60°$ (c) $120°$ (e) $-210°$ (f) $300°$ (g) $720°$ (h) $15°$

3. (a) $\pm\frac{4}{5}$

4. (a) $-\frac{\sqrt{3}}{2}$

5. (a) Intermediate Steps: $a = 26$, $B = 42°$ Final Angle: $C = 78°$ (b) Intermediate Steps: $A = 127°$, $C = 25°$ Final Angle: $B = 28°$ (c) $A = 128°$ (d) $A = 15.6°$, $C = 12.9°$, $b = 727$ (e) $A = 39°$, $B = 57°$, $C = 84°$

6. $A = 67$, $\alpha = 360$, $\theta = \frac{\pi}{4}$

7. (a) 6:00pm (b) 9:11am (c) 538.75 (d) 392.5 (e) 116

8. (a) 6 (b) A=30, B=15 (c) 1500 l/hr