MATH155: Trigonometry Basics

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Name: _____ Date: _____ Score: / 30

Learning Objectives

- Convert between degrees and radians
- Find exact values of sine, cosine, and tangent at standard angles
- Apply the unit circle to evaluate trigonometric functions
- Use SOH-CAH-TOA to solve right triangles

Simplify each expression completely. Show all steps and circle your final answer.

Radian and degree conversion

1. Convert 180° to radians. Express your answer as a fraction times pi.

180°

Answer: _____

2. Convert the radian measure 1*pi/3 to degrees.

$\frac{1\pi}{3}$

Answer: _____

3. Convert 90° to radians. Express your answer as a fraction times pi.

90°

Answer: _____

4. Convert the radian measure 3*pi/6 to degrees.

$\frac{3\pi}{6}$

Answer: _____

5. Convert 240° to radians. Express your answer as a fraction times pi.

240°

Answer: _____

6. Convert the radian measure 2*pi/4 to degrees.

$$\frac{2\pi}{4}$$

Answer: _____

7. Convert 180° to radians. Express your answer as a fraction times pi.

$$180\,^{\circ}$$

Answer: _____

8. Convert the radian measure 1*pi/4 to degrees.

$$\frac{1\pi}{4}$$

Answer: _____

9. Convert 225° to radians. Express your answer as a fraction times pi.

$$225\,^{\circ}$$

Answer: _____

10. Convert the radian measure 2*pi/6 to degrees.

$$\frac{2\pi}{6}$$

Answer: _____

11. Convert 225° to radians. Express your answer as a fraction times pi.

$$225\,^{\circ}$$

Answer: _____

12. Convert the radian measure 4*pi/2 to degrees.

$$\frac{4\pi}{2}$$

Answer: _____

13. Convert 60° to radians. Express your answer as a fraction times pi.

$$60\,^{\circ}$$

Answer: _____

14. Convert the radian measure 1*pi/6 to degrees.

$$\frac{1\pi}{6}$$

Answer: _____

15. Convert 60° to radians. Express your answer as a fraction times pi.

$$60^\circ$$

Answer: _____

16. Convert the radian measure 3*pi/6 to degrees.

$$\frac{3\pi}{6}$$

Answer: _____

Unit circle trig values

17. Find the exact value of sin(135°) using the unit circle.

$$\sin(135^\circ)$$

Answer: _____

18. Find the exact value of tan(45°) using the unit circle.

$$\tan(45^\circ)$$

Answer: _____

19. Find the exact value of sin(120°) using the unit circle.

$$\sin(120^\circ)$$

Answer: _____

20. Find the exact value of tan(0°) using the unit circle.

$$\tan(0^\circ)$$

Answer: _____

21. Find the exact value of sin(90°) using the unit circle.

$$\sin(90^\circ)$$

Answer: _____

22. Find the exact value of tan(120°) using the unit circle.

$\tan(120^\circ)$

Answer: _____

23. Find the exact value of cos(0°) using the unit circle.

$\cos(0^\circ)$

Answer: _____

24. Find the exact value of tan(0°) using the unit circle.

$\tan(0^\circ)$

Answer: _____

25. Find the exact value of cos(90°) using the unit circle.

$\cos(90^\circ)$

Answer: _____

26. Find the exact value of tan(60°) using the unit circle.

$\tan(60^\circ)$

Answer: _____

27. Find the exact value of sin(150°) using the unit circle.

$\sin(150^\circ)$

Answer: _____

28. Find the exact value of tan(60°) using the unit circle.

$\tan(60^\circ)$

Answer: _____

29. Find the exact value of sin(150°) using the unit circle.

$\sin(150^\circ)$

Answer: _____

30. Find the exact value of tan(150°) using the unit circle.

$\tan(150^\circ)$

Answer: _____

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ANSWER KEY & SOLUTIONS

Topics: Radian and degree conversion, Unit circle trig values. All answers verified by independent computation.

Solutions

Radian and degree conversion

1. Convert 180° to radians. Express your answer as a fraction times pi.

180°

→ *Multiply by pi/180: 180° * (pi / 180) = 6 * pi / 6.*
→ *Simplify the fraction: 1*pi / 1.*

Answer: 1π

2. Convert the radian measure 1*pi/3 to degrees.

$\frac{1\pi}{3}$

→ *Multiply by 180/pi: (1pi/3) * (180/pi) = 1 * 180 / 3.*
→ *= 180 / 3 = 60°.*

Answer: 60°

3. Convert 90° to radians. Express your answer as a fraction times pi.

90°

→ *Multiply by pi/180: 90° * (pi / 180) = 1 * pi / 2.*
→ *Simplify the fraction: 1*pi / 2.*

Answer: $\frac{1\pi}{2}$

4. Convert the radian measure 3*pi/6 to degrees.

$\frac{3\pi}{6}$

→ *Multiply by 180/pi: (3pi/6) * (180/pi) = 3 * 180 / 6.*
→ *= 540 / 6 = 90°.*

Answer: 90°

5. Convert 240° to radians. Express your answer as a fraction times pi.

240°

→ *Multiply by pi/180: 240° * (pi / 180) = 4 * pi / 3.*
→ *Simplify the fraction: 4*pi / 3.*

Answer: $\frac{4\pi}{3}$

6. Convert the radian measure 2*pi/4 to degrees.

$\frac{2\pi}{4}$

→ *Multiply by 180/pi: (2pi/4) * (180/pi) = 2 * 180 / 4.*
→ *= 360 / 4 = 90°.*

Answer: 90°

7. Convert 180° to radians. Express your answer as a fraction times pi.

180°

→ *Multiply by pi/180: 180° * (pi / 180) = 2 * pi / 2.*
→ *Simplify the fraction: 1*pi / 1.*

Answer: 1π

---

8. Convert the radian measure 1*pi/4 to degrees.

$\frac{1\pi}{4}$

→ *Multiply by 180/pi: (1pi/4) * (180/pi) = 1 * 180 / 4.*
→ *= 180 / 4 = 45°.*

Answer: 45°

---

9. Convert 225° to radians. Express your answer as a fraction times pi.

225°

→ *Multiply by pi/180: 225° * (pi / 180) = 5 * pi / 4.*
→ *Simplify the fraction: 5*pi / 4.*

Answer: $\frac{5\pi}{4}$

---

10. Convert the radian measure 2*pi/6 to degrees.

$\frac{2\pi}{6}$

→ *Multiply by 180/pi: (2pi/6) * (180/pi) = 2 * 180 / 6.*
→ *= 360 / 6 = 60°.*

Answer: 60°

---

11. Convert 225° to radians. Express your answer as a fraction times pi.

225°

→ *Multiply by pi/180: 225° * (pi / 180) = 5 * pi / 4.*
→ *Simplify the fraction: 5*pi / 4.*

Answer: $\frac{5\pi}{4}$

---

12. Convert the radian measure 4*pi/2 to degrees.

$\frac{4\pi}{2}$

→ *Multiply by 180/pi: (4pi/2) * (180/pi) = 4 * 180 / 2.*
→ *= 720 / 2 = 360°.*

Answer: 360°

---

13. Convert 60° to radians. Express your answer as a fraction times pi.

60°

→ *Multiply by pi/180: 60° * (pi / 180) = 1 * pi / 3.*
→ *Simplify the fraction: 1*pi / 3.*

Answer: $\frac{1\pi}{3}$

---

14. Convert the radian measure 1*pi/6 to degrees.

$\frac{1\pi}{6}$

→ *Multiply by 180/pi: (1pi/6) * (180/pi) = 1 * 180 / 6.*
→ *= 180 / 6 = 30°.*

Answer: 30°

---

15. Convert 60° to radians. Express your answer as a fraction times pi.

60°

→ *Multiply by pi/180: 60° * (pi / 180) = 1 * pi / 3.*
→ *Simplify the fraction: 1*pi / 3.*

Answer: $\frac{1\pi}{3}$

---

16. Convert the radian measure 3*pi/6 to degrees.

$\frac{3\pi}{6}$

→ *Multiply by 180/pi: (3pi/6) * (180/pi) = 3 * 180 / 6.*
→ *= 540 / 6 = 90°.*

Answer: 90°

Unit circle trig values

17. Find the exact value of sin(135°) using the unit circle.

$\sin(135^\circ)$

→ *Locate 135° on the unit circle.*
→ *The coordinates at this angle are (cos, sin) = (-sqrt(2)/2, sqrt(2)/2).*
→ *sin(135°) = sqrt(2)/2.*

Answer: $\sin(135^\circ) = sqrt(2)/2$

18. Find the exact value of tan(45°) using the unit circle.

$\tan(45^\circ)$

→ *Use the identity tan(theta) = sin(theta) / cos(theta).*
→ *At 45°: sin = sqrt(2)/2, cos = sqrt(2)/2.*
→ *tan(45°) = sqrt(2)/2 / sqrt(2)/2 = 1.*

Answer: $\tan(45^\circ) = 1$

19. Find the exact value of sin(120°) using the unit circle.

$\sin(120^\circ)$

→ *Locate 120° on the unit circle.*
→ *The coordinates at this angle are (cos, sin) = (-1/2, sqrt(3)/2).*
→ *sin(120°) = sqrt(3)/2.*

Answer: $\sin(120^\circ) = sqrt(3)/2$

20. Find the exact value of tan(0°) using the unit circle.

$\tan(0^\circ)$

→ *Use the identity tan(theta) = sin(theta) / cos(theta).*
→ *At 0°: sin = 0, cos = 1.*
→ *tan(0°) = 0 / 1 = 0.*

Answer: $\tan(0^\circ) = 0$

21. Find the exact value of sin(90°) using the unit circle.

$\sin(90^\circ)$

→ *Locate 90° on the unit circle.*
→ *The coordinates at this angle are (cos, sin) = (0, 1).*
→ *sin(90°) = 1.*

Answer: $\sin(90^\circ) = 1$

22. Find the exact value of tan(120°) using the unit circle.

$\tan(120^\circ)$

→ *Use the identity tan(theta) = sin(theta) / cos(theta).*
→ *At 120°: sin = sqrt(3)/2, cos = -1/2.*
→ *tan(120°) = sqrt(3)/2 / -1/2 = -sqrt(3).*

Answer: $\tan(120^\circ) = -sqrt(3)$

23. Find the exact value of cos(0°) using the unit circle.

$\cos(0^\circ)$

→ *Locate 0° on the unit circle.*
→ *The coordinates at this angle are (cos, sin) = (1, 0).*
→ *cos(0°) = 1.*

Answer: $\cos(0^\circ) = 1$

---

24. Find the exact value of tan(0°) using the unit circle.

$\tan(0^\circ)$

→ *Use the identity tan(theta) = sin(theta) / cos(theta).*
→ *At 0°: sin = 0, cos = 1.*
→ *tan(0°) = 0 / 1 = 0.*

Answer: $\tan(0^\circ) = 0$

---

25. Find the exact value of cos(90°) using the unit circle.

$\cos(90^\circ)$

→ *Locate 90° on the unit circle.*
→ *The coordinates at this angle are (cos, sin) = (0, 1).*
→ *cos(90°) = 0.*

Answer: $\cos(90^\circ) = 0$

---

26. Find the exact value of tan(60°) using the unit circle.

$\tan(60^\circ)$

→ *Use the identity tan(theta) = sin(theta) / cos(theta).*
→ *At 60°: sin = sqrt(3)/2, cos = 1/2.*
→ *tan(60°) = sqrt(3)/2 / 1/2 = sqrt(3).*

Answer: $\tan(60^\circ) = sqrt(3)$

---

27. Find the exact value of sin(150°) using the unit circle.

$\sin(150^\circ)$

→ *Locate 150° on the unit circle.*
→ *The coordinates at this angle are (cos, sin) = (-sqrt(3)/2, 1/2).*
→ *sin(150°) = 1/2.*

Answer: $\sin(150^\circ) = 1/2$

---

28. Find the exact value of tan(60°) using the unit circle.

$\tan(60^\circ)$

→ *Use the identity tan(theta) = sin(theta) / cos(theta).*
→ *At 60°: sin = sqrt(3)/2, cos = 1/2.*
→ *tan(60°) = sqrt(3)/2 / 1/2 = sqrt(3).*

Answer: $\tan(60^\circ) = sqrt(3)$

---

29. Find the exact value of sin(150°) using the unit circle.

$\sin(150^\circ)$

→ *Locate 150° on the unit circle.*
→ *The coordinates at this angle are (cos, sin) = (-sqrt(3)/2, 1/2).*
→ *sin(150°) = 1/2.*

Answer: $\sin(150^\circ) = 1/2$

---

30. Find the exact value of tan(150°) using the unit circle.

$\tan(150^\circ)$

→ *Use the identity tan(theta) = sin(theta) / cos(theta).*
→ *At 150°: sin = 1/2, cos = -sqrt(3)/2.*
→ *tan(150°) = 1/2 / -sqrt(3)/2 = -sqrt(3)/3.*

Answer: $\tan(150^\circ) = -sqrt(3)/3$
