

Mth 86 Outcomes for Exam 1

NAME _____

After studying, place a check mark next to those outcomes you feel you understand and/or are proficient with. Place a question mark next to those outcomes which you feel your skills/understanding is questionable. Turn in with your test.

To be successful on Exam 1 you should be able to ...

Prerequisite Material

1. Solve a linear equation algebraically.
2. Convert units of measure.
3. Find areas, perimeters and volumes.
4. Find slope as decimal, fraction, pitch or grade.

Circles

1. Find the arc length or circumference of a circle from partial information.
2. Find the area or sector of a circle from partial information.
3. Switch among alternate rotational velocities (ω). e.g. rpm \leftrightarrow rad/sec
4. Find linear velocities of a rotating object. e.g. velocity of rock ejected from rotating tire
5. Find rotational velocities in a combination of connected gears. (Indirect proportion)
6. Convert angles among various formats: $\pm\theta$ in radians, $\pm\theta$ in DMS, bearing, azimuth.
7. Use $\sin \theta$, $\cos \theta$, $\tan \theta$ to find coordinates on the unit circle ($r = 1$).
8. Use $\sin \theta$, $\cos \theta$, $\tan \theta$ to find coordinates on edge of circle when $r \neq 1$.

Triangles & Trigonometry

1. Apply the Pythagorean Theorem to find missing dimensions.
2. Apply similar triangles to find missing dimensions.
3. Apply $\sin \theta$, $\cos \theta$, $\tan \theta$ to find missing dimensions.
4. Apply $\sin^{-1} y/r$, $\cos^{-1} x/r$, $\tan^{-1} y/x$ to find missing angles.
5. Apply right triangle trigonometry to solve basic applications.

Some Sample Problems

- 1) Find the slope of the line through (14, -19) & (26, 15).
- 2) Convert slope above to (a) decimal (b) pitch (c) grade
- 3) Solve for x: $\frac{2x-4}{3} + 5 = 12 - \frac{5x-7}{2}$
- 4) Solve for y: $\frac{4x+5y}{2} = 4 - \frac{y}{3}$

Problems 5 - 8 refer to fig 1

- 5) What is the length of belt contact on the two rollers?
- 6) The 24" drum turns at 200 rpm. What is the 8" drum's rpm?
- 7) What is the rotational velocity in radians/sec of each drum?
- 8) How fast is the belt moving (ft/sec)?
- 9) How fast (rpm) must the larger drum rotate so that the belt moves at 500 ft/min?
- 10) A garage door opener uses a 6" pulley to wrap the cable. If the pulley turns at 25 rpm, how fast does the door rise?
- 11) How many degrees are there between the two hands of the clock at 9:25? (give the smaller angle)
- 12) A ratchet turns a bolt $48^\circ 50' 30''$ with each pull. How many pulls will turn the bolt (a) 20 revolutions, (b) 25π rad?
- 13) Road speed = 60 mph. Tire diameter = 42" (a) What is the tire's rpm? _____ (b) What is the tire's rad/sec? _____
- 14) Convert $\theta = 135^\circ$ to its equivalent (a) + radian angle _____, (b) - deg angle _____, (c) azimuth _____ (d) Mark -960° on the circle, (e) now rotate $+4240^\circ$ and mark the new position.

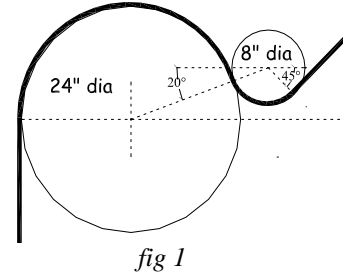
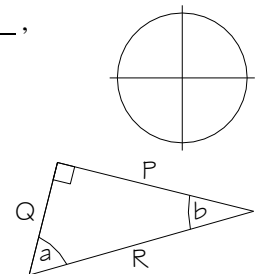


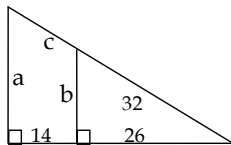
fig 1

- 15) Use the diagram to answer (a) - (f)

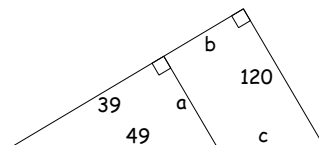


- (a) $\tan a =$ (b) $\sin a =$ (c) $\cos b =$
 (d) $\sin^{-1}(Q/R) =$ (e) $\text{invtan}(P/Q) =$ (f) $\sin^{-1}(\sin a) =$

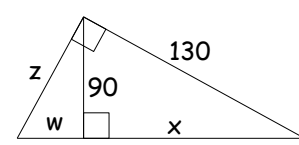
16) Find a, b & c



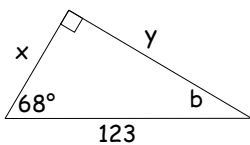
17) Find a, b & c



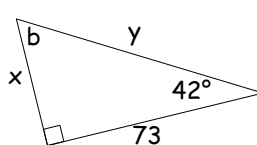
18) Find x, y, z



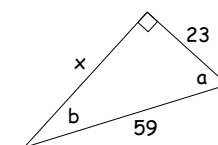
19) Find x, y, b



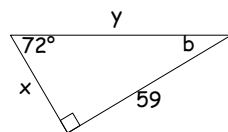
20) Find x, y, b



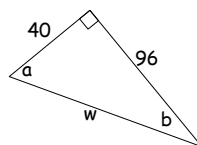
21) Find x, a, b



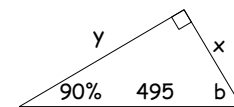
22) Find x, y, b



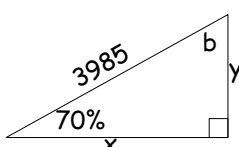
23) Find a, b, w



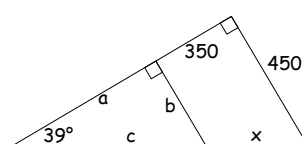
24) Find x, y b°



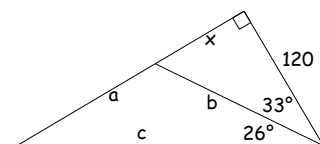
25) Find x, y, b°



26) Find a, b, c, x



27) Find a, b, c, x



Answers (unchecked)

- 1) $m = \frac{1}{3}$
- 2) (a) 0.33; (b) $\frac{4}{12}$; (c) 33%
- 3) $x = \frac{71}{19}$
- 4) $y = \frac{(2y - 12x)}{17}$
- 5) $119\pi/9$ in
- 6) 600 rpm
- 7) (a) large drum: $20\pi/3$ rad/sec; (b) small drum: 20π rad/sec
- 8) $20\pi/3$ ft/sec
- 9) $250/\pi$ rpm
- 10) 2.5π in/sec
- 11) 132.5°
- 12) (a) 147.4 rev \rightarrow 148 rev; (b) 92.1 rev \rightarrow 93 rev.
- 13) (a) 480.19 rpm; (b) ~ 50.29 rad/sec
- 14) (a) $3\pi/4$; (b) -225° ; (c) 315° azi; (d) $= +120^\circ$; (e) $= +40^\circ$
- 15) (a) $\tan a = P/Q$; (b) $\sin a = P/R$; (c) $\cos b = P/R$; (d) $\sin^{-1}(Q/R) = b$; (e) $\text{invtan}(P/Q) = a$; (f) $\sin^{-1}(\sin a) = a$
- 16) $a = 28.70$; $b = 18.65$; $c = 17.23$
- 17) $a = 29.66$; $b = 118.76$; $c = 149.21$
- 18) $w = 86.35$; $x = 93.81$; $z = 124.72$
- 19) $x = 46.08$; $y = 114.04$; $b = 22^\circ$
- 20) $x = 65.73$; $y = 98.23$; $b = 48^\circ$
- 21) $x = 54.33$; $a = 67.06^\circ$; $b = 22.94^\circ$
- 22) $x = 19.17$; $y = 62.04$; $b = 18^\circ$
- 23) $a = 67.38^\circ$; $b = 22.62^\circ$; $w = 104$
- 24) $90\% = 41.99^\circ$; $x = 331.14$; $y = 367.93$; $b = 48.01^\circ$
- 25) $70\% = 34.99^\circ$; $x = 3264.64$; $y = 2285.25$; $b = 55.01^\circ$
- 26) $a = 365.06$; $b = 295.62$; $c = 469.74$; $x = 375.13$
- 27) $a = 121.78$; $b = 143.08$; $c = 232.99$; $x = 77.93$