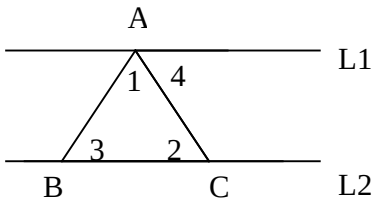
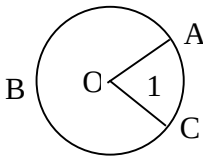
MDPT - Geometry Practice Problems

1. Δ ABC is an isosceles triangle with base BC. L1 and L2 are parallel. 1=80°. Find 4.



   a. 80° b. 50°
   c. 45° d. 60°

2. In the figure, the measure of arc ABC is 7 π/ 4 and O is the center. of the circle. Find 1.



   a. 30° b. 50°
   c. 40° d. 45°

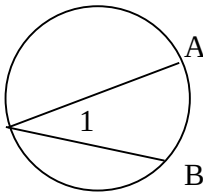
3. Find the area of an equilateral triangle with a sides of length 12.

   a. $72\sqrt{2}$ b. 72 c. $36\sqrt{3}$ d. 36

4. Find the area of a circle inscribed in a square with sides of length 8 cm.

   a. $4\pi\,cm^2$ b. $2\pi\,cm^2$ c. $16\pi\,cm^2$ d. $8\pi\,cm^2$

5. In the figure, 1=40°. Find Arc AB.



   a. 60°
   b. 40°
   c. 20°
   d. 80°

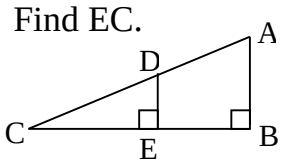
6. Find the length of one of the equal sides of an isosceles triangle with a perimeter 105 if the base is one-third the length of one of the equal sides.

   a. 45 b. 15 c. 35 d. 25

7. An 8 ft by 10 ft garden is surrounded by a 2 ft walkway. Find the area of thewalkway?

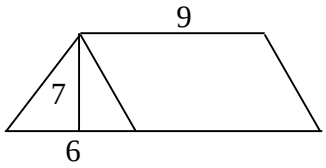
   a. 160 ft^2 b. 82 ft^2 c. 158 ft^2 d. 88 ft^2

8. In the figure, AB=12, DE=9, and BE=4. Find EC.



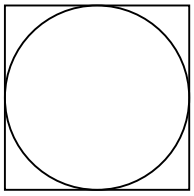
a. 12 b. 16
c. 13 d. 21

9. Find the volume of a tent with length 9 ft, height 7 ft, and a 6 foot base.



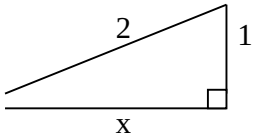
a. 567 ft^3 b. 189 ft^3
c. 94.5 ft^3 d. 162 ft^3

10. The circle in the figure has a circumference of 10π inches. What is the area of the square circumscribed about the circle?



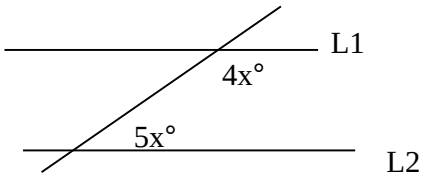
a. 25 in^2 b. 50 in^2 c. 100 in^2 d. 25π in^2

11. For the right triangle in the figure, find x.



a. 5 b. $\sqrt{5}$
c. $\sqrt{3}$ d. 3

12. In the figure L1 and L2 are parellel. Find x.

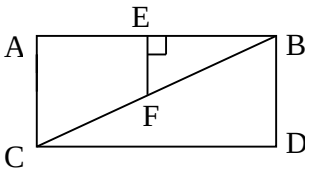


a. 18° b. 10°
c. 9° d. 20°

13. $2\pi/3$ radians is how many degrees?

a. 60° b. 90° c. 120° d. 180°

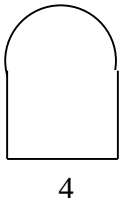
14. In the figure, BC is a diagonal of rectangle ABCD. EF is perpendicular to AB and DCB=35°. Find EFB.



a. 35° b. 45°
c. 55° d. 65°

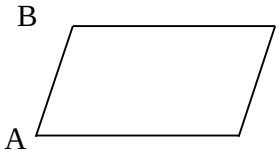
15. The object in the figure has a square base with sides of length 4 and a semicircular top. Find the perimeter of the object.

a. $16+2\pi$ b. $12+2\pi$
c. $16+4\pi$ d. 32



16. For the parallelogram in the figure A=50°. Find B.

a. 180° b. 50°
c. 130° d. 40°

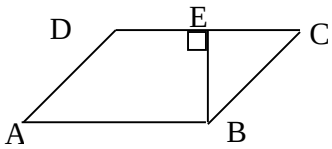


17. Express 45° in radians.

a. $\pi/8$ b. $\pi/4$ c. $\pi/2$ d. π

18. In the figure, parallelgram ABCD has an area of 48. If BC = 5 and BE = 4, what is the perimeter of parallelogram ABCD?

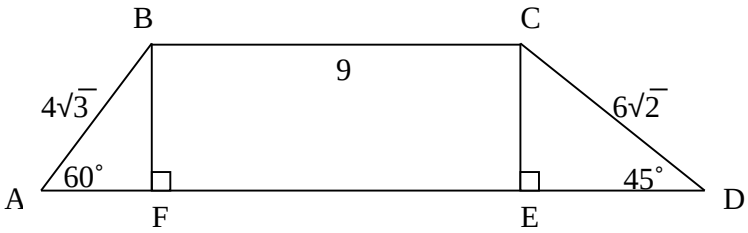
a. 26 b. 32
c. 34 d. 36



19. The volume of a right cylinder is 300 in^3. If the radius is doubled, what will the new volume be?

a. 900 in^3 b. 2400 in^3 c. 600 in^3 d. 1200 in^3

20. Find the area of trapezoid ABCD in the figure below.

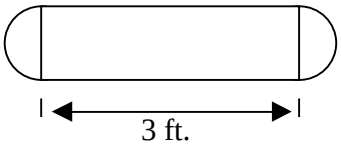


a. 90 b. $11\sqrt{2}+2$ c. $72+6\sqrt{3}$ d. 84

21. Find the volume of the tank in the diagram below.
where the domes are hemispheres with diameter 6 inches.

a. $63\pi \text{ in}^3$ b. $396\pi \text{ in}^3$

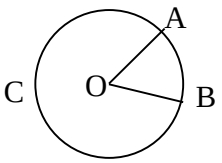
c. $360\pi \text{ in}^3$ d. $1544\pi \text{ in}^3$



22. Find the arclength of arc AB if O is the center, the measure of arc ACB is 300°, and the radius of the circle is 10.

a. 60 b. 60π

c. $10\pi/3$ d. $50\pi/3$



23. If ΔABC and Δabc are similar triangles with AC=20, BC=16, bc=12, B=70°, and c=60°, find A and ac.

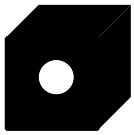
a. A=50°, ac=10 b. A=60°, ac=16

c. A=70°, ac=18 d. A=50°, ac=15

24. What is the volume of material left if a hole with a radius of 1 is drilled through a solid cube with sides of 4? (see drawing)

a. $64 - 16\pi$ b. $12 - 16\pi$

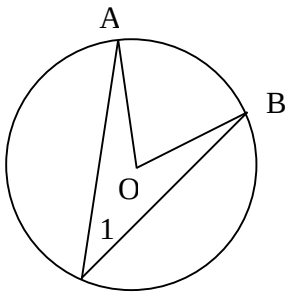
c. $16 - 4\pi$ d. $64 - 4\pi$



25. In the figure below, the length of arc AB is π inches, the radius of the circle is 3 inches, and O is the center. Find the measure of 1.

a. 30° b. 20°

c. 40° d. 60°



26. Find the distance between the points (8,7) and (3,-5).

a. $\sqrt{5}$ b. $\sqrt{13}$ c. 13 d. 5

27. Find the midpoint between the points (3,-5) and (8,7).

a. $\left(\frac{5}{2}, 6\right)$ b. $\left(\frac{11}{2}, 6\right)$

c. $\left(\frac{11}{2}, 1\right)$ d. $\left(\frac{5}{2}, 1\right)$

Answers

1. b	2. d	3. c	4. c	5. d	6. a	7. d	8. a	9. b
10. c	11. c	12. d	13. c	14. c	15. b	16. c	17. b	18. c
19. d	20. c	21. c	22. c	23. d	24. d	25. a	26. c	27. c

Solutions

1. 2+ 3 = 180° – 1 = 180° - 80˚ = 100˚
   ΔABC isosceles, so 2 = 3, therefore 2 = 50˚
   Since L1 and L2 are parellel, 2 = 4
   4 = 50°

2. arc AC = 2π - 7π/4 = π/4 = 180˚/4 = 45˚
   Since 1 is a central angle, 1 = arc AC
   1 = 45°

3. An altitude from a vertex to an opposite side bisects the side.
   Use the **Pythagorean** formula to find the height
   $h^2 + 6^2 = 12^2$
   $h = 6\sqrt{3}$
   Area = $\frac{1}{2}(base)(height) = \frac{1}{2}(12)(6\sqrt{3}) = 36\sqrt{3}$

4. d = side of the square = 8 cm, but d is also the diameter of the circle
   r = (1/2) d = 4 cm, where r is the radius of the circle
   Area of the circle = $\pi r^2 = \pi(4\text{ cm})^2 = 16\pi\text{ cm}^2$

5. 1 is an inscribed angle.
   Arc length = twice the measure of the inscribed angle.
   Arc AB = 2 1; Arc AB = 2 (40°) = 80°

6. If the base = x then the equal sides = 3x
   Perimeter = 105
   105 = x + 3x + 3x = 7x
   x = 15, so equal sides = (3)(15) = 45

7. Area of garden = (8 ft)(10 ft) = 80 ft^2
   The garden + walkway together have width 8 ft + 2 ft + 2 ft = 12 ft
   The garden + walkway together have length 10 ft + 2 ft + 2 ft = 14 ft
   Area of garden + walkway together = (12 ft)(14 ft) = 168 ft^2
   Area of walkway = 168 ft^2 – 80 ft^2 = 88 ft^2

8. ΔABC and ΔDEC are similar, so the ratios of corresponding sides are equal

$$\frac{AB}{DE} = \frac{BC}{EC}$$

Let CE = x, then $\frac{12}{9} = \frac{4+x}{x}$

Cross multiply and solve for x: x = 12

9. Volume = (area of base) (height)

The base is a triangle with base 6 ft and height 7 ft

Area of base = (1/2)(7 ft)(6 ft) = 21 ft^2

Volume = (21 ft^2)(9 ft) = 189 ft^3

10. Circumference = πd, where d is the diameter

10π in = πd

d = 10 in, this is also the length of the side of the square

Area of a square = $side^2$ = $(10\text{ in})^2$ = 100 in^2

11. For right trangles $a^2 + b^2 = c^2$, where c is the hypotenuse

$x^2 + 1^2 = 2^2$

$x^2 = 4 - 1$

$x = \sqrt{3}$

12. L_1 and L_2 are parellel so the angles are supplemental.

$4x + 5x = 180°$

$x = 20°$

13. Use the fact that π radians equals 180°:

2(180°)/3 = 120°

14. $\overline{AC}$ and $\overline{BD}$ are parellel so DCB = EBF

DCB = 35˚ so EBF = 35˚

EFB = 180˚ - 90˚ - 35˚ = 55˚

15. Perimeter of base = 4 + 4 + 4 = 12

Perimeter of Semicircle: C = (1/2) πd

d = 4 because of the base.

C = (1/2) $\pi 4 = 2\pi$

Total perimeter = $12 + 2\pi$

16. Adjacent andles in a parallelogram are supplemental

$B + A = 180^\circ$

$B + 50^\circ = 180^\circ$

$B = 130^\circ$

17. Use the fact that 180° equals π radians:

$180^\circ/\pi = 45^\circ/x$

$x = 45^\circ\pi/180^\circ$

$x = \pi/4$

18. Area parallelogram = (base) (height)

48 = 4(base)

12= base

Perimeter = 12 + 5 + 12 + 5 = 34

19. $V = \pi r^2 h$, where v is volume of a right cylinder, r is radius, and h is the height.

When r is doubled, r^2 is replaced by $(2r)^2 = 4r^2$

This increases the original volume by **4**

$(300 \text{ in}^3)(4) = 1200 \text{ in}^3$

20. ΔCDE is a 45˚-45˚-90˚ so $ED = \frac{6\sqrt{2}}{\sqrt{2}} = 6$

CE = ED, so CE = 6

ΔABF is a 30˚-60˚-90˚ so $AF = \frac{4\sqrt{3}}{2} = 2\sqrt{3}$

Area = (1/2) (CE) (BC + AD)

Area = $(1/2)(6)(9 + 2\sqrt{3} + 9 + 6) = 72 + 6\sqrt{3}$

21. $V_{tank} = V_{domes} + V_{cylinder}$, but two domes = sphere, so

$V_{tank} = V_{sphere} + V_{cylinder}$

$V_{tank} = \frac{4}{3}\pi r^3 + \pi r^2 h$ where r is 3 inches and h is 36 inches

$V_{tank} = \frac{4}{3}\pi \times 3^3 + \pi 3^3 \times 36 = 360\pi$

22. arc measure AB = 360° - arc measure ACB = 360° - 300° = 60°

AOB = 60°, central angle equals the measure of the intercepted arc

$$arclen = \frac{AOB}{360} 2\pi r = \frac{60}{360} 2\pi \times 10 = \frac{10}{3}\pi$$

23. Since the triangles are similar, all corresponding angles are equal and corresponding sides are proportional. So,

C = c = 60°

A = 180° - B - C = 180° - 70° - 60° = 50°

$$\frac{AC}{ac} = \frac{BC}{bc} \qquad \frac{20}{ac} = \frac{16}{12} \qquad ac = 15$$

24. $V = V_{cube} - V_{cylinder}$

$V = side^3 - \pi r^2 h = 4^3 - \pi 1^2 \text{ x } 4 = 64 - 4\pi$

25. $arclenAB = \frac{AOB}{360°} 2\pi r \qquad \pi = \frac{AOB}{360°} 2\pi 3$, solve for AOB

AOB = 360° / 6 = 60°

1 = (1/2) AOB = (1/2) 60° = 30°

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

$d = \sqrt{(8-3)^2 + (7-(-5))^2}$

$d = \sqrt{5^2 + 12^2}$

$d = \sqrt{25 + 144}$

$d = \sqrt{169}$

$d = 13$

27. $\left(\frac{x_1 + x_2}{2}, \frac{y_1 + y_2}{2}\right)$ midpoint formula

$\left(\frac{3+8}{2}, \frac{-5+7}{2}\right)$

$\left(\frac{11}{2}, \frac{2}{2}\right)$

$\left(\frac{11}{2}, 1\right)$

Algebra Practice Problems for ELM and MDPT Math Analysis

1. Multiply and simplify: $(-4x^2)(5x^5)$

   a. $-20x^{10}$ b. x^7 c. $-20x^7$ d. $9x^{10}$

2. Simplify: $\left(\frac{x^{4/3}y^{1/2}}{x^{1/3}}\right)^{-1/2}$

   a. $\frac{1}{x^{1/2}y^{1/4}}$ b. x c. $xy^{-1/4}$ d. $\frac{x^{1/6}}{y^{1/4}}$

3. Simplify $\sqrt[3]{128a^4c^6}$

   a. $42ac^2\sqrt{a}$ b. $4ac^2\sqrt{2}$ c. $6ac^3$ d. $4ac^2\sqrt[3]{2a}$

4. Simplify: $5\sqrt{18x} - 3\sqrt{8x} + \sqrt{x^2}$

   a. $3\sqrt{2x} + x$ b. $3\sqrt{2x} + 2x$
   c. $9\sqrt{2x} + 2x$ d. $9\sqrt{2x} + x$

5. Simplify: $\sqrt[12]{x^3}\sqrt[8]{x^2}$

   a. $\sqrt[20]{x^5}$ b. $\sqrt{x}$ c. $\sqrt[16]{x}$ d. x^{16}

6. Solve: 4a – 7 = a + 4

   a. $\frac{11}{3}$ b. -1 c. $-\frac{3}{5}$ d. $\frac{11}{5}$

7. Solve: $\frac{x+1}{3} + \frac{x-1}{10} = 5$

   a. $5/2$ b. $12/13$ c. $-2/13$ d. 11

8. Solve: 1.30P - 1.50(20 – P) = 82

   a. -560 b. 40 c. $191/14$ d. -191

9. If $f(x) = x^2 - x + 4$, find: f(-3)

   a. -8 b. 10 c. -2 d. 16

10. If f(x) = 4x - 3, find f(r+1)

a. 4r + 1 b. r - 2 c. 4r - 3 d. r - 4

11. Evaluate f(x) = 16x – 8 for x = 2

a. 1 b. 12 c. 24 d. 2

12. Find the domain of the function $f(x) = \frac{x-3}{2x-1}$

a. all x except x = 3 b. all x except x = 0

c. all x except x = -2 d. all x except x = 1/2

13. The cost C in dollars to produce x items is given by C = 100 + 0.5x. How many items can be produced for 400 dollars?

a. 150 b. 600 c. 300 d. 900

14. Solve: 5(x + 3) = 3(x + 3) + 6

a. 0 b. 2 c. 15 d. $15/4$

15. The height of the Empire State Building and its antenna is 1472 feet. The difference in height between the building and the antenna is 1028 feet. How tall is the antenna?

a. 444 ft. b. 1250 ft. c. 111 ft. d. 222 ft.

16. Solve the system: $\frac{5}{6}x + \frac{y}{4} = 7$ and $\frac{2}{3}x - \frac{y}{8} = 3$

a. x = -6, y = 48 b. x = 6, y = 8

c. x = 12, y = -12 d. x = $\frac{5}{13}$, y = $\frac{1042}{39}$

17. Find the equation of a line passing through the point (2, -4) and having a slope of 3.

a. y = 3x + 10 b. y = 3x + 4

c. y = 3x - 6 d. y = 3x - 10

18. Find the equation of the line passing through the point (1, -2) and perpendicular to the line y - 2x = 1

a. $y = \frac{1}{2}x - 6$ b. y = -2x + 4

c. y = 2x + 2 d. $y = -\frac{1}{2}x - \frac{3}{2}$

19. Find the equation of the line passing through the points (2,4) and (-7,3)

a. $y = \frac{1}{9}x + \frac{34}{9}$ b. y = -9x – 16

c. y = -9x + 14 d. $y = \frac{1}{9}x - \frac{36}{9}$

20. A plane flies 600 miles with the wind for 2 hours. The return trip against the wind takes 3 hours. Find the speed of the wind.

a. 250 mph b. 5 mph c. 50 mph d. 25 mph

21. Solve: 3x – 2 < 2(x – 2)

a. x < 2 b. x > 2 c. x < -2 d. x > -2

22. Solve: ½2x – 4 ½= 8

a. 2 or -6 b. 6 or -2 c. 6 d. -2

23. Solve: ½4x + 2 ½- 4 ≥ 2

a. x ≤ -1 or x ≥ 2 b. –1 ≥ x ≥ 2

c. –2 ≥ x ≥ 3 d. x ≤ -2 or x ≥ 1

24. Subtract: $(10x^3 + 8x^2 – 7x – 3) - (4x^3 - 2x^2 + x -7)$

a. $6x^3 + 10x^2 – 8x + 4$ b. $6x^3 + 6x^2 – 6x - 10$

c. $6x^3 – 6x^2 – 8x - 10$ d. $6x^3 + 10x^2 – 6x + 4$

25. Multiply: (3x - 2) (5x + 1)

a. $8x^2 - 4x - 2$ b. $15x^2 + 13x + 2$

c. $15x^2 - 7x - 2$ d. $8x^2 + 13x + 2$

26. Factor: $81x^2 - y^2$

a. $(81x + y)(x - y)$ b. $(9x - y)(9x - y)$

c. $(x - y)(81x - y)$ d. $(9x + y)(9x - y)$

27. Factor: $3y^2 - 7y + 2$

a. $(3y - 2)(y + 1)$ b. $(3y - 1)(y - 2)$

c. $(3y - 1)(y + 2)$ d. $(3y + 1)(y - 2)$

28. Simplify the fraction: $\dfrac{x^2 + 4x - 5}{x - 1}$

a. $x + 5$ b. $x + 4$ c. $x - 4$ d. $x - 5$

29. Simplify the fraction: $\dfrac{4x^2 - 8x + 6}{4x}$

a. $\dfrac{x^2 - 2x + 6}{x}$ b. $4x^2 + 4$

c. $x - 2 + \dfrac{3}{2x}$ d. $-7x+6$

30. Divide and simplify: $\dfrac{x + 5}{25 - x^2} \div \dfrac{x^2 + 4x + 3}{x^2 - 2x - 15}$

a. $-\dfrac{1}{x + 1}$ b. $\dfrac{x + 1}{(x - 5)^2}$ c. $\dfrac{1}{x + 5}$ d. $-\dfrac{x + 1}{x - 5}$

31. Solve the given equation: $\dfrac{2}{x^2 - 4} + \dfrac{5}{x + 2} = \dfrac{7}{x - 2}$

a. 1 b. 13 c. -11 d. -2

32. Find the roots of $f(x) = x^2 - 5x + 6$

a. 0 and 6 b. -1 and 6 c. 2 and 3 d. -5 and 6

33. Solve for x: $\log_2 8 = x$

a. 1 b. 2 c. 3 d. 8

34. Write $4\log_b x + \log_b y - 3\log_b z$ as one log

a. $\log(4x + y - 3z)$ b. $\log(x^4 + y - z^3)$

c. $\log(4xy) / 3z$ d. $\log(x^4 y) / z^3$

35. Solve for x: $\log_4 x + \log_4(x - 6) = 2$

a. 8 b. 6 c. 0 or 6 d. -2 or 8

36. Simplify $\left(\sqrt{3}+2\right)^2$

a. $4+2\sqrt{3}$ b. 7 c. $7+4\sqrt{3}$ d. 49

37. Solve: $3[2(x - 5) - 2(4x - 7)] = (4 + 5)(x + 1)$

a. 1/9b. -3 c. -1/3 d. 9

38. Find the roots for $(x + 1)(x - 2) = 10$

a. -1 and 2 b. -2 and 4 c. -3 and 4 d. -1 and 4

39. Multiply and simplify: $(-4 + 2i)(5 - 3i)$

a. -14+22i b. $-10+22I-6i^2$ c.$-20+16i^2$ d. -20-6i

40. Simplify: $\sqrt{8}-\sqrt{-4}$

a. $2\sqrt{2}-2i$ b. $\sqrt{12}$ c. $2\sqrt{2}+2$ d. 2

Answers

1. c	2. a	3. d	4. d	5. b	6. a	7. d	8. b	9. d	10. a
11. c	12. d	13. b	14. a	15. d	16. b	17. d	18. d	19. a	20. c
21. c	22. b	23. d	24. a	25. c	26. d	27. b	28. a	29. c	30. a
31. c	32. c	33. c	34. d	35. a	36. c	37. a	38. c	39. a	40. a

Solutions

1. $(-4)(5)x^{2+5} = -20x^7$

2. $\left(x^{\frac{4}{3}-\frac{1}{3}}y^{\frac{1}{2}}\right)^{-\frac{1}{2}} = \left(xy^{\frac{1}{2}}\right)^{-\frac{1}{2}} = x^{-\frac{1}{2}}y^{\frac{1}{2}\left(-\frac{1}{2}\right)} = x^{-\frac{1}{2}}y^{-\frac{1}{4}} = \dfrac{1}{x^{\frac{1}{2}}y^{\frac{1}{4}}}$

3. $\sqrt[3]{2 \times 4^3 a^3 ac^3 c^3} = 4acc\sqrt[3]{2a} = 4ac^2\sqrt[3]{2a}$

4. $5\sqrt{2 \quad 9x} - 3\sqrt{2 \quad 4x} + x$

   $5 \quad 3\sqrt{2x} - 3 \quad 2\sqrt{2x} + x$

   $15\sqrt{2x} - 6\sqrt{2x} + x$

   $9\sqrt{2x} + x$

5. $x^{\frac{3}{12}}x^{\frac{2}{8}}$ convert to exponent form

   $x^{\frac{1}{4}}x^{\frac{1}{4}}$ reduce the fractional exponents

   $x^{\frac{1}{2}}$ add exponents, then convert back to radical form:

   $\sqrt{x}$

6. 4a - a = 4 + 7 3a = 11 a = 11/3

7. $30\left(\dfrac{x+1}{3} + \dfrac{x-1}{10}\right) = 5 \times 30$, multiply by the common denominator

   10(x + 1) + 3(x - 1) = 150

   13x + 7 = 150

   x = 143/13 = 11

8. 13p - 15(20 - p) = 820, multiply through by 10

   28p - 300 = 820

   p = 1120/28 = 40

9. $(-3)^2 - (-3) + 4 = 9 + 3 + 4 = 16$

10. 4(r + 1) - 3 = 4r +4 - 3 = 4r + 1

11. f(2) = 16(2) - 8 = 32 - 8 = 24

12. Since 0 can't be a denominator, 2x - 1 can't equal 0

The domain is all x except, 2x - 1 = 0 2x = 1 x = 1/2

Domain is all x except x = 1/2

13. Plug in 400 for C and solve for x:

400 = 100 + .5x 300 = .5x 600 = x

14. 5x + 15 = 3x + 9 + 6 2x = 0 x = 0

15. Let x = building height and y = antenna height, then

x + y = 1472 ft

x - y = 1028 ft

2x = 2500 ft, add the two equations together

x = 1250 ft

1250 ft + y = 1472 ft, plug in x and solve for y

y = 222 ft

16. $\frac{1}{2} \times \frac{5x}{6} + \frac{1}{2} \times \frac{y}{4} = 7 \times \frac{1}{2}$, multiply by 1/2 to get y/8

$\frac{5x}{12} + \frac{y}{8} = \frac{7}{2}$

$\frac{2x}{3} - \frac{y}{8} = 3$, add this to the above equation

$\frac{5x}{12} + \frac{2x}{3} = \frac{7}{2} + 3$, solve for x

$\frac{13}{12}x = \frac{13}{2}$

x = 6

$\frac{5 \times 6}{6} + \frac{y}{4} = 7$, plug x into an original equation and solve for y

y = 8

17. Use $y - y_1 = m(x - x_1)$, where slope m is 3 and point (x_1,y_1) is (2,-4)

$y - (-4) = 3(x - 2)$ $\quad$ $y + 4 = 3x - 6$ $\quad$ $y = 3x - 10$

18. Solve $y - 2x = 1$ to find the slope of this line

$y = 2x + 1$, the slope of this line is 2
use the negative reciprocol of this slope, or -1/2 for a line

$y - (-2) = -\frac{1}{2}(x - 1)$ (similar to problem 14)

$y = -\frac{1}{2}x - \frac{3}{2}$

19. Use $m = \frac{y_1 - y_2}{x_1 - x_2}$ for the slope thru points (x_1,y_1) and (x_2,y_2)

$m = \frac{4 - 3}{2 - (-7)} = \frac{1}{9}$

$y - 4 = \frac{1}{9}(x - 2)$, plug in slope and one of the points

$y = \frac{1}{9}x + \frac{34}{9}$

20. Use d = rt, where d is distance, r is rate (speed), t is time
Let x = speed of the plane and y = speed of the wind

With the wind: r = speed of the plane + the wind:
$600 = (x + y)(2)$, divide by 2 $\quad$ $300 = x + y$

Against the wind: r = speed of the plane - the wind:
$600 = (x - y)(3)$, divide by 3 $\quad$ $200 = x - y$

Add the two equations:
$300 = x + y$
$200 = x - y$

$500 = 2x$ $\quad$ $250 = x$

Plug x into one of the equations and solve for y:

$300 = 250 + y$ $\quad$ $y = 50$

21. $3x - 2 < 2x - 4$

$x < -2$

22. $2x - 4 = -8$ or $2x - 4 = 8$, remove | | and solve for ±8

$2x = -4$ or $2x = 12$

$x = -2$ or $x = 6$

23. $|4x + 2| \geq 6$, isolate the | | term

$-6 \geq 4x+2 \geq 6$, remove | | and solve with ±6

$-8 \geq 4x \geq 4$

$-2 \geq x \geq 1$, check for solution for AND or OR by graphing

Use OR since the intervals don't overlap, so

$x \leq -2$ OR $x \geq 1$

24. $10x^3 + 8x^2 - 7x - 3 - 4x^3 + 2x^2 - x + 7$, remove (), combine like terms

note: the - in front of the () changes the signs of all terms inside

$6x^3 + 10x^2 - 8x + 4$

25. $15x^2 + 3x - 10x - 2$, multiply (use FOIL) then combine like terms

$15x^2 - 7x - 2$

26. Use difference of two squares: $a^2 - b^2 = (a + b)(a - b)$

$(9x)^2 - y^2 = (9x + y)(9x - y)$

27. $3 \times 2 = 6$ (product of end numbers)

$6 = (-1)(-6)$ and $-1 + -6 = -7$ (middle number)

Replace $-7y$ with $-1y + -6y$:

$3y^2 - y - 6y + 2$, group terms in pairs and factor:

$y(3y - 1) - 2(3y - 1)$, factor out $(3y - 1)$:

$(3y - 1)(y - 2)$

28. $\dfrac{(x+5)(x-1)}{x-1}$, factor the numerator then cancel (x-1):

$x + 5$

29. $\frac{4x^2}{4x} - \frac{8x}{4x} + \frac{6}{4x}$, split up into seperate frations and simplify:

$x - 2 + \frac{3}{2x}$

30. $\frac{x+5}{(-1)(x^2-25)} \times \frac{x^2-2x-15}{x^2+4x+3}$, invert second term and multiply

$\frac{x+5}{(-1)(x+5)(x-5)} \times \frac{(x-5)(x+3)}{(x+3)(x+1)}$, factor then cancel factors:

$-\frac{1}{x+1}$

31. Multiply through by (x + 2)(x - 2) which is the common denominator

$(x+2)(x-2)(\frac{2}{x^2-4} + \frac{5}{x+2}) = \frac{7}{x-2}(x+2)(x-2)$

note that x^2-4 is (x + 2)(x - 2)

2 + 5(x - 2) = 7(x + 2)

2 + 5x - 10 = 7x + 14

-2x = 22

x = -11

32. For roots, find x for f(x)=0:

0 = x^2 - 5x + 6 factor to solve

0 = (x - 2)(x - 3) true when either factor is 0

roots are: 2 and 3

33. $2^x = 8$ convert to exponent form, then find x

Since $2^3 = 8$, x = 3

34. $\log_b x^4 + \log_b y - \log_b z^3$ using the rule: c $\log_b m = \log_b m^c$

$\log_b x^4 y - \log_b z^3$ using the rule: $\log_b m + \log_b n = \log_b mn$

$\log(x^4 y) / z^3$ using the rule: $\log_b m - \log_b n = \log_b m/n$

35. $\log_4 x(x - 6) = 2$ write as one log (see #34 above)

$x(x - 6) = 4^2$ convert to exponent form

$x^2 - 6x - 16 = 0$ set to 0 and factor to solve

$(x - 8)(x + 2) = 0$

$x = 8$ or $x = -2$, but the log of a negative is not allowed

$x = 8$

36. $\left(\sqrt{3}+2\right)\left(\sqrt{3}+2\right)$ multiply simplify

$\sqrt{3}\sqrt{3}+2\sqrt{3}+2\sqrt{3}+4 = 3+4\sqrt{3}+4 = 7+4\sqrt{3}$

37. $3[2x - 10 - 8x + 14] = 9(x + 1)$

$6x - 30 - 24x + 42 = 9x + 9$

$-18x + 12 = 9x + 9$

$-27x = -3$

$x = 1/9$

38. To find roots, expand, set equal to 0 and factor:

$x^2 - 2x + x - 2 = 10$

$x^2 - x - 12 = 0$

$(x - 4)(x + 3) = 0$

$x = 4$ and -3

39. $(-4 + 2i)(5 - 3i) = (-4)(5) + (-4)(-3i) + (2i)(5) + (2i)(-3i)$

$= -20 + 12i + 10i - 6i^2$

$= -20 + 22I - 6(-1)$ $\qquad i^2 = -1$

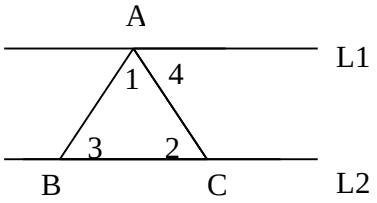
$= -20 + 22i + 6 = -14 + 22i$

40. $\sqrt{8} - \sqrt{-4} = \sqrt{2 \times 4} - \sqrt{4i^2}$ $\qquad$ use $i^2 = -1$

$2\sqrt{2} - 2i$

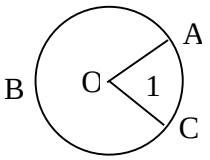
Geometry Practice Problems

1. Δ ABC is an isosceles triangle with base BC. L1 and L2 are parallel. 1=80°. Find 4.



   a. 80° b. 50°
   c. 45° d. 60°

2. In the figure, the measure of arc ABC is 7 π/ 4 and O is the center. of the circle. Find 1.



   a. 30° b. 50°
   c. 40° d. 45°

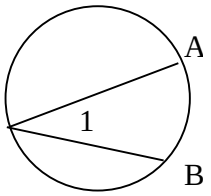
3. Find the area of an equilateral triangle with a sides of length 12.

   a. $72\sqrt{2}$ b. 72 c. $36\sqrt{3}$ d. 36

4. Find the area of a circle inscribed in a square with sides of length 8 cm.

   a. $4\pi\,cm^2$ b. $2\pi\,cm^2$ c. $16\pi\,cm^2$ d. $8\pi\,cm^2$

5. In the figure, 1=40°. Find Arc AB.



   a. 60°
   b. 40°
   c. 20°
   d. 80°

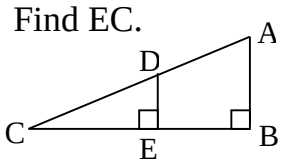
6. Find the length of one of the equal sides of an isosceles triangle with a perimeter 105 if the base is one-third the length of one of the equal sides.

   a. 45 b. 15 c. 35 d. 25

7. An 8 ft by 10 ft garden is surrounded by a 2 ft walkway. Find the area of thewalkway?

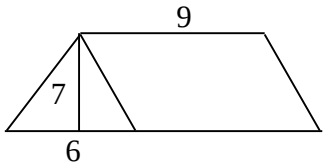
   a. 160 ft^2 b. 82 ft^2 c. 158 ft^2 d. 88 ft^2

8. In the figure, AB=12, DE=9, and BE=4. Find EC.



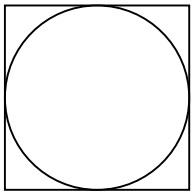
a. 12 b. 16
c. 13 d. 21

9. Find the volume of a tent with length 9 ft, height 7 ft, and a 6 foot base.



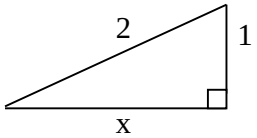
a. 567 ft^3 b. 189 ft^3
c. 94.5 ft^3 d. 162 ft^3

10. The circle in the figure has a circumference of 10π inches. What is the area of the square circumscribed about the circle?



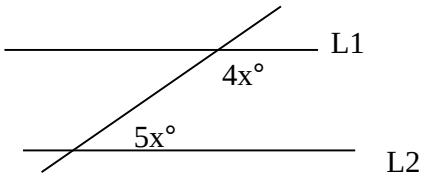
a. 25 in^2 b. 50 in^2 c. 100 in^2 d. 25π in^2

11. For the right triangle in the figure, find x.



a. 5 b. $\sqrt{5}$
c. $\sqrt{3}$ d. 3

12. In the figure L1 and L2 are parellel. Find x.

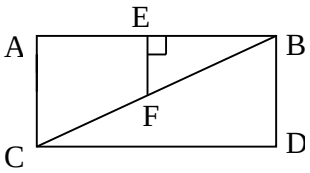


a. 18° b. 10°
c. 9° d. 20°

13. $2\pi/3$ radians is how many degrees?

a. 60° b. 90° c. 120° d. 180°

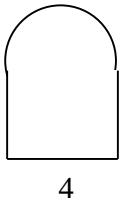
14. In the figure, BC is a diagonal of rectangle ABCD. EF is perpendicular to AB and DCB=35°. Find EFB.



a. 35° b. 45°
c. 55° d. 65°

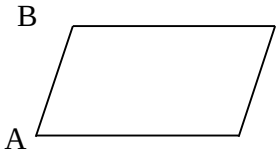
15. The object in the figure has a square base with sides of length 4 and a semicircular top. Find the perimeter of the object.

a. $16+2\pi$ b. $12+2\pi$
c. $16+4\pi$ d. 32



16. For the parallelogram in the figure A=50°. Find B.

a. 180° b. 50°
c. 130° d. 40°

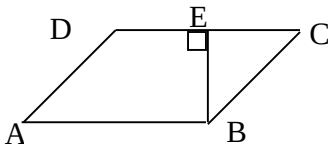


17. Express 45° in radians.

a. $\pi/8$ b. $\pi/4$ c. $\pi/2$ d. π

18. In the figure, parallelgram ABCD has an area of 48. If BC = 5 and BE = 4, what is the perimeter of parallelogram ABCD?

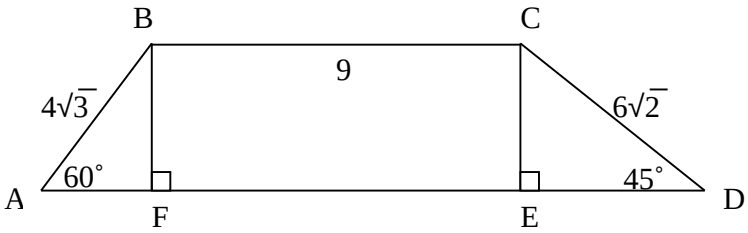
a. 26 b. 32
c. 34 d. 36



19. The volume of a right cylinder is 300 in^3. If the radius is doubled, what will the new volume be?

a. 900 in^3 b. 2400 in^3 c. 600 in^3 d. 1200 in^3

20. Find the area of trapezoid ABCD in the figure below.

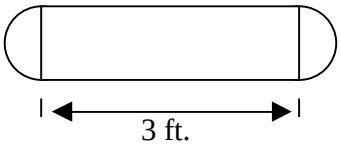


a. 90 b. $11\sqrt{2}+2$ c. $72+6\sqrt{3}$ d. 84

21. Find the volume of the tank in the diagram below.
where the domes are hemispheres with diameter 6 inches.

a. $63\pi \text{ in}^3$ b. $396\pi \text{ in}^3$

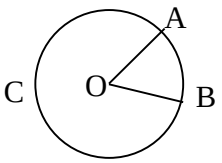
c. $360\pi \text{ in}^3$ d. $1544\pi \text{ in}^3$



22. Find the arclength of arc AB if O is the center, the measure of arc ACB is 300°, and the radius of the circle is 10.

a. 60 b. 60π

c. $10\pi/3$ d. $50\pi/3$



23. If ΔABC and Δabc are similar triangles with AC=20, BC=16, bc=12, B=70°, and c=60°, find A and ac.

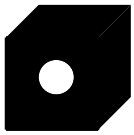
a. A=50°, ac=10 b. A=60°, ac=16

c. A=70°, ac=18 d. A=50°, ac=15

24. What is the volume of material left if a hole with a radius of 1 is drilled through a solid cube with sides of 4? (see drawing)

a. $64 - 16\pi$ b. $12 - 16\pi$

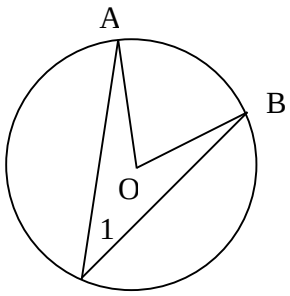
c. $16 - 4\pi$ d. $64 - 4\pi$



25. In the figure below, the length of arc AB is π inches, the radius of the circle is 3 inches, and O is the center. Find the measure of 1.

a. 30° b. 20°

c. 40° d. 60°



Answers

1. b	2. d	3. c	4. c	5. d	6. a	7. d	8. a	9. b
10. c	11. c	12. d	13. c	14. c	15. b	16. c	17. b	18. c
19. d	20. c	21. c	22. c	23. d	24. d	25. a		

Solutions

1. 2+ 3 = 180° – 1 = 180° - 80˚ = 100˚
   ΔABC isosceles, so 2 = 3, therefore 2 = 50˚
   Since L1 and L2 are parellel, 2 = 4
   4 = 50°

2. arc AC = 2π - 7π/4 = π/4 = 180˚/4 = 45˚
   Since 1 is a central angle, 1 = arc AC
   1 = 45°

3. An altitude from a vertex to an opposite side bisects the side.
   Use the **Pythagorean** formula to find the height
   $h^2 + 6^2 = 12^2$
   $h = 6\sqrt{3}$
   Area = $\frac{1}{2}(base)(height) = \frac{1}{2}(12)(6\sqrt{3}) = 36\sqrt{3}$

4. d = side of the square = 8 cm, but d is also the diameter of the circle
   r = (1/2) d = 4 cm, where r is the radius of the circle
   Area of the circle = $\pi r^2 = \pi(4\text{ cm})^2 = 16\pi\text{ cm}^2$

5. 1 is an inscribed angle.
   Arc length = twice the measure of the inscribed angle.
   Arc AB = 2 1; Arc AB = 2 (40°) = 80°

6. If the base = x then the equal sides = 3x
   Perimeter = 105
   105 = x + 3x + 3x = 7x
   x = 15, so equal sides = (3)(15) = 45

7. Area of garden = (8 ft)(10 ft) = 80 ft^2
   The garden + walkway together have width 8 ft + 2 ft + 2 ft = 12 ft
   The garden + walkway together have length 10 ft + 2 ft + 2 ft = 14 ft
   Area of garden + walkway together = (12 ft)(14 ft) = 168 ft^2
   Area of walkway = 168 ft^2 – 80 ft^2 = 88 ft^2

8. ΔABC and ΔDEC are similar, so the ratios of corresponding sides are equal

$$\frac{AB}{DE} = \frac{BC}{EC}$$

Let CE = x, then $\frac{12}{9} = \frac{4+x}{x}$

Cross multiply and solve for x: x = 12

9. Volume = (area of base) (height)

The base is a triangle with base 6 ft and height 7 ft

Area of base = (1/2)(7 ft)(6 ft) = 21 ft^2

Volume = (21 ft^2)(9 ft) = 189 ft^3

10. Circumference = πd, where d is the diameter

10π in = π d

d = 10 in, this is also the length of the side of the square

Area of a square = $side^2$ = $(10\text{ in})^2$ = 100 in^2

11. For right trangles $a^2 + b^2 = c^2$, where c is the hypotenuse

$x^2 + 1^2 = 2^2$

$x^2 = 4 - 1$

$x = \sqrt{3}$

12. L_1 and L_2 are parellel so the angles are supplemental.

$4x + 5x = 180°$

$x = 20°$

13. Use the fact that π radians equals 180°:

2(180°)/3 = 120°

14. $\overline{AC}$ and $\overline{BD}$ are parellel so DCB = EBF

DCB = 35˚ so EBF = 35˚

EFB = 180˚ - 90˚ - 35˚ = 55˚

15. Perimeter of base = 4 + 4 + 4 = 12

Perimeter of Semicircle: C = (1/2) π d

d = 4 because of the base.

C = (1/2) π 4 = 2 π

Total perimeter = 12 + 2π

16. Adjacent andles in a parallelogram are supplemental

$B + A = 180^\circ$

$B + 50^\circ = 180^\circ$

$B = 130^\circ$

17. Use the fact that 180° equals π radians:

$180^\circ/\pi = 45^\circ/x$

$x = 45^\circ\pi/180^\circ$

$x = \pi/4$

18. Area parallelogram = (base) (height)

48 = 4(base)

12= base

Perimeter = 12 + 5 + 12 + 5 = 34

19. $V = \pi r^2 h$, where v is volume of a right cylinder, r is radius, and h is the height.

When r is doubled, r^2 is replaced by $(2r)^2 = 4r^2$

This increases the original volume by **4**

$(300 \text{ in}^3)(4) = 1200 \text{ in}^3$

20. ΔCDE is a 45˚-45˚-90˚ so $ED = \frac{6\sqrt{2}}{\sqrt{2}} = 6$

CE = ED, so CE = 6

ΔABF is a 30˚-60˚-90˚ so $AF = \frac{4\sqrt{3}}{2} = 2\sqrt{3}$

Area = (1/2) (CE) (BC + AD)

Area = $(1/2)(6)(9 + 2\sqrt{3} + 9 + 6) = 72 + 6\sqrt{3}$

21. $V_{tank} = V_{domes} + V_{cylinder}$, but two domes = sphere, so

$V_{tank} = V_{sphere} + V_{cylinder}$

$V_{tank} = \frac{4}{3}\pi r^3 + \pi r^2 h$ where r is 3 inches and h is 36 inches

$V_{tank} = \frac{4}{3}\pi \times 3^3 + \pi 3^3 \times 36 = 360\pi$

22. arc measure AB = 360° - arc measure ACB = 360° - 300° = 60°

AOB = 60°, central angle equals the measure of the intercepted arc

$$arclen = \frac{AOB}{360} 2\pi r = \frac{60}{360} 2\pi \times 10 = \frac{10}{3}\pi$$

23. Since the triangles are similar, all corresponding angles are equal and corresponding sides are proportional. So,

C = c = 60°

A = 180° - B - C = 180° - 70° - 60° = 50°

$$\frac{AC}{ac} = \frac{BC}{bc} \qquad \frac{20}{ac} = \frac{16}{12} \qquad ac = 15$$

24. $V = V_{cube} - V_{cylinder}$

$V = side^3 - \pi r^2 h = 4^3 - \pi 1^2 \text{ x } 4 = 64 - 4\pi$

25. $arclenAB = \frac{AOB}{360°} 2\pi r \qquad \pi = \frac{AOB}{360°} 2\pi 3$, solve for AOB

AOB = 360° / 6 = 60°

1 = (1/2) AOB = (1/2) 60° = 30°