

$$\frac{x}{6x-9} - \frac{1}{x}$$

1) For what value of x does the expression above equal 0?

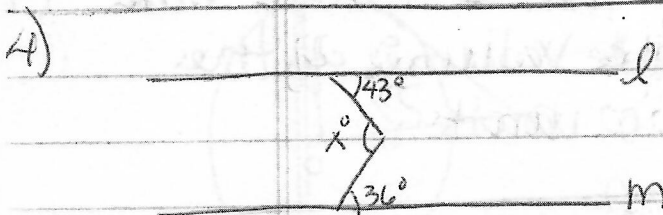
2) Let $g(x) = x^2 - 9x + 18$ and $h(x) = \frac{g(x)}{x-a}$, where

a is a constant. If $h(4) = \frac{1}{12}$, what is the value of a ?

3) $\frac{1}{a} - \frac{1}{b} = 2$ $\frac{1}{a} + \frac{1}{b} = 8$

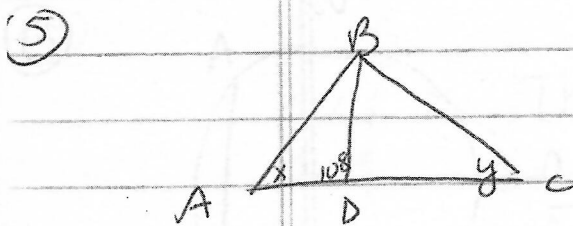
Given the system above, what is the value of $a+b$?

- A) $\frac{1}{15}$ B) $\frac{1}{8}$ C) $\frac{8}{15}$ D) $\frac{8}{5}$



If lines l and m are parallel, what is the value of x ?

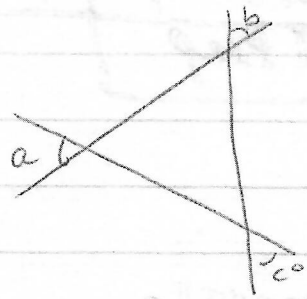
- a) 43 c) 86
b) 79 d) 101



In the figure, point D is on side AC of triangle ABC . If $AD = DB = DC$, what is the value of $x+y$?

- a) 72
b) 90
c) 96
d) 108

6)



What is the value of c in terms of a and b ?

a) $180 - a - b$

c) $90 + b + a$

b) $180 - a + b$

d) $a + b$

7)

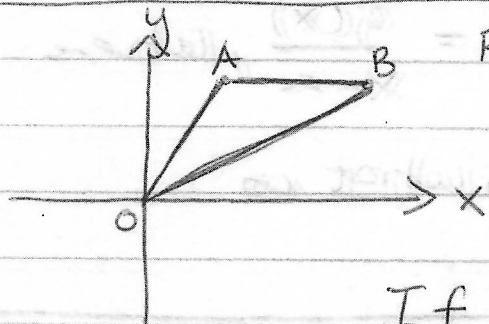
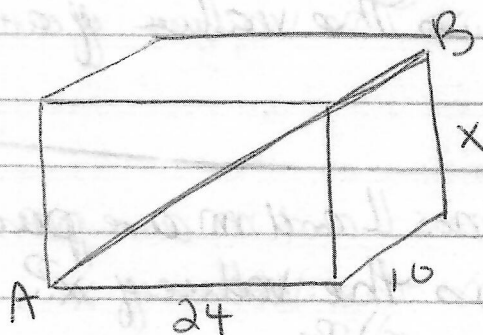


Figure not drawn to scale

In the xy -plane, points A and B lie on the graph of the line $y=6$

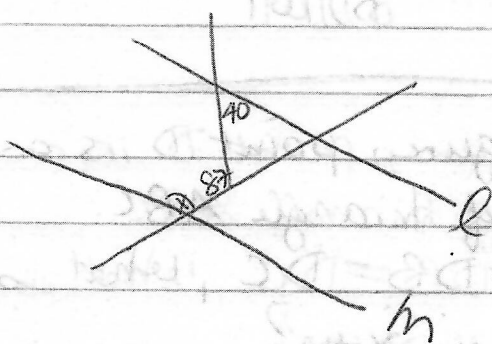
If \overline{OB} has a slope of $\frac{1}{2}$ and $AB=5$ what is the slope of \overline{OA} ?

8)



The figure is of a rectangular box with length of 24, width of 10 and height of x . If $AB = \sqrt{712}$ what is the volume of the box in cubic units?

9)



Lines l and m are parallel what is the value of x ?

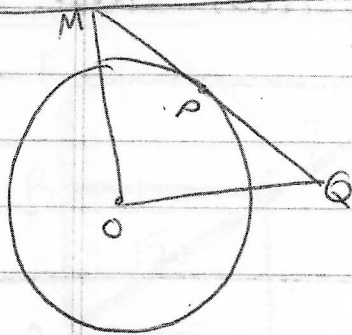
10) What is the perimeter of an equilateral triangle inscribed in a circle with circumference of 24π ?

- a) $36\sqrt{2}$ c) $30\sqrt{3}$
 b) $36\sqrt{3}$ d) $24\sqrt{6}$

11) Which of the following equations represents a circle in the xy plane that passes through the point $(1, 5)$ and has a center of $(3, 2)$?

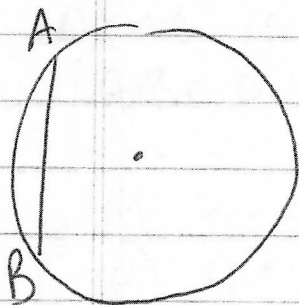
- A) $(x-3)^2 + (y-2)^2 = \sqrt{13}$
 B) $(x-3)^2 + (y-2)^2 = 13$
 C) $(x-1)^2 + (y-5)^2 = 13$
 D) $(x-3)^2 + (y-2)^2 = 25$

12)



In the figure, \overline{MQ} is tangent to the circle at point P , $MO = \sqrt{269}$ and $\angle Q = 90^\circ$. If the circle has an area of 100π , what is the area of triangle MOQ ?

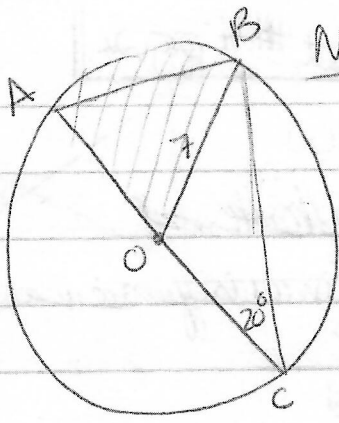
13)



The circle has an area of 100π square centimeters. If $AB = 8$, how far is \overline{AB} from the center of the circle?

- a) 6
 b) 8
 c) $6\sqrt{2}$
 d) $2\sqrt{2}$

(14)

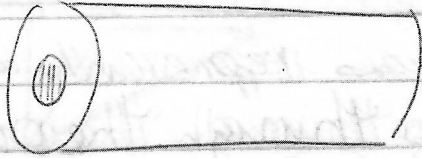


Note: Figure not drawn to scale

In the figure, AC is diameter of circle O and $OB = 7$. If the measure of $\angle ACB = 20^\circ$, what is the area of the shaded sector?

a) $\frac{7\pi}{6}$ b) $\frac{14\pi}{9}$ c) $\frac{49\pi}{12}$ d) $\frac{49\pi}{9}$

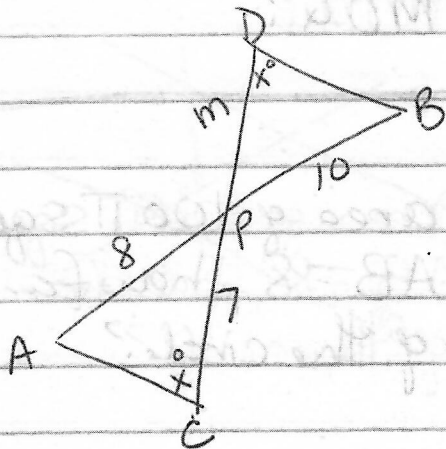
(15)



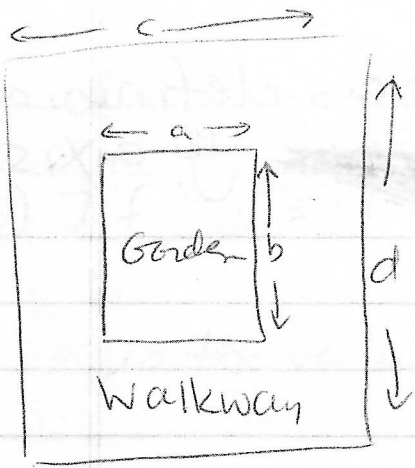
The figure above shows a wooden cylindrical tube with a length of 10 centimeters and a diameter of 4 centimeters. It has a cylindrical hole with diameter of 2 centimeters that extends 40% of the length of the tube. If the density of the wood is 4.2 grams per cubic centimeter, what is the mass of this tube, to the nearest gram?

- a) 151 c) 468
b) 343 d) 475

(16)



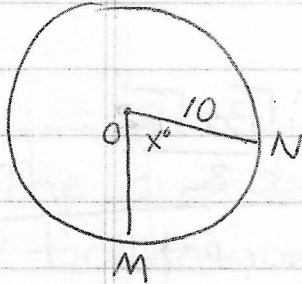
What is the value of m



7)

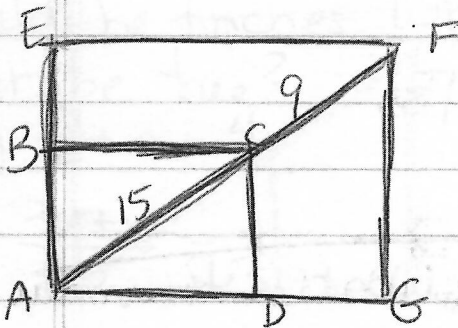
The figure shows a side drawing of a rectangular garden surrounded by a walkway that is 6 feet wide. If the ratio of a to b is $5:8$ and the ratio of c to d is $3:4$, what is the area of the garden (not including the walkway) in square feet?

18)



In the figure, arc \widehat{MN} has a length of 11.5. To the nearest integer, what is the value of x ?

19)



The figure shows two rectangles that share a common vertex, and \overline{AF} is a line segment that passes through C .

What is the ratio of the area of rectangle $ABCD$ to the area of rectangle $A E F$?

- A) $3:5$
- B) $9:25$
- C) $5:8$
- D) $25:64$

(20) Which of the following equations defines a circle that is tangent to the ~~the~~ y-axis?

a) $(x-2)^2 + (y+3)^2 = 2$

b) $(x-2)^2 + (y+3)^2 = 3$

c) $(x-2)^2 + (y+3)^2 = 4$

d) $(x-2)^2 + (y+3)^2 = 9$

(21) No calculator

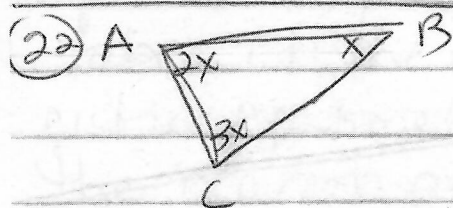
Which of the following is equivalent to $\cos \frac{\pi}{4} - \sin \frac{\pi}{6}$?

A) $\frac{1-\sqrt{3}}{2}$

B) $\frac{\sqrt{2}-\sqrt{3}}{2}$

C) $\frac{\sqrt{2}-1}{2}$

D) $\frac{\sqrt{3}-\sqrt{2}}{2}$



x represents the measure of the smallest angle. What is the tangent of $2x$?

a) $\frac{\sqrt{2}}{2}$

b) $\frac{\sqrt{3}}{3}$

c) $\frac{\sqrt{3}}{2}$

d) $\sqrt{3}$

(23) If $\frac{\pi}{2} < x < \pi$ and $\sin x = 0.8$ what is the value of $\cos x$?

A) -0.80

B) -0.60

C) -0.25

D) 0.60

(24) If $i^2 = -1$ what is the value of i^{34} ?

a) i

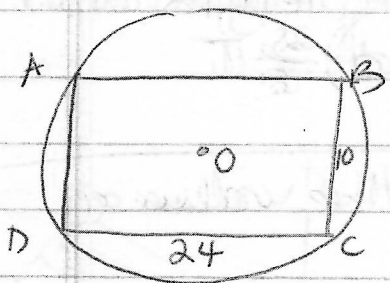
b) $-i$

c) 1

d) -1

25) If $i^2 = -1$ and $\frac{1+2i}{2+3i} = a+bi$, what is the value of $a+b$?

26)



In the figure, rectangle ABCD is inscribed in the circle with center O. What is the area of the circle?

- a) 26π c) 144π
 b) 121π d) 169π

27) The bird department of a pet store has 12 canaries, 30 finches, and 18 parrots. If the pet store purchased n more finches, then 80% of its birds would be finches. Which of the following equations must be true?

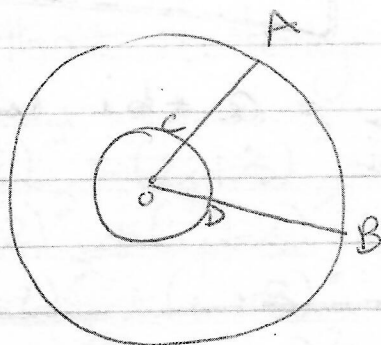
- a) $\frac{1}{2} + n = \frac{4}{5}$ c) $\frac{30+n}{60+n} = \frac{4}{5}$
 b) $\frac{30+n}{60} = \frac{4}{5}$ d) $\frac{n}{60+n} = \frac{4}{5}$

28) $3x^2 = 4x + c$

In the equation above c is a constant. If $x = -1$ is a solution of this equation, what other value of x satisfies the equation?

- A) $\frac{1}{7}$ C) $\frac{7}{3}$
 B) $\frac{4}{3}$ D) 7

29)



The figure shows two concentric circles with center O . If $OD = 3$, $DB = 5$, and the length of arc AB is 5π , what is the length of arc CD ?

- A) $\frac{7}{4}\pi$ B) $\frac{15}{8}\pi$ C) 3π D) $\frac{35}{8}\pi$

30) If $4 + \sqrt{b} = 7.2$, what is the value of $4 - \sqrt{b}$?

31) If one pound of grain can feed either 5 chickens or 2 pigs, then ten pounds of grain can feed 20 chickens and how many pigs?

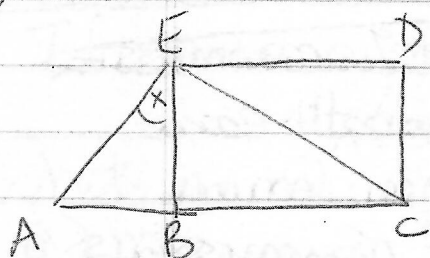
32) If $f(x) = -x + 7$ and $g(f(x)) = 2x + 1$, what is the value of $g(2)$?

- a) -11 b) -5 c) 5 d) 11

33) The function f is a quadratic function with zeroes at $x=1$ and $x=5$. The graph of $y=f(x)$ in the xy -plane is a parabola with a vertex of $(3, -2)$. What is the y -intercept of this graph?

34) When graphed in the xy -plane, the line $y = mx - 4$ intersects the x -axis at an angle of θ . If $m > 0$, $0^\circ < \theta < 90^\circ$ and $\cos \theta = \frac{3}{\sqrt{58}}$, what is the value of m ?

(35)

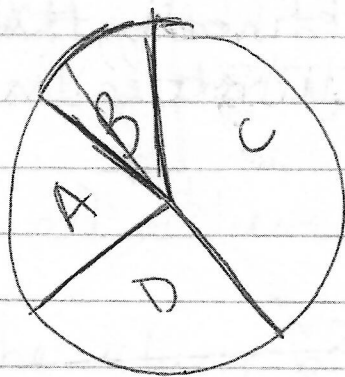


In the figure, $BCDE$ is a rectangle, $AC = 14$, $BC = 12$, $EC = 13$. What is the value of $\tan x$?

- A) 0.4 B) 0.6 C) 1.3 D) 2.5

Questions 36, 37, 38 are based on graph below

MONTHLY SALES



The pie graph represents the monthly ad sales for four salespeople - Maria, Eli, Georgie, and Zoe. For the month, Maria's sales accounted for 25% of the total, Eli had \$3000 in sales, Georgie had \$5000 in sales, and Zoe had \$10,000 in sales.

- (40) If m is a number chosen randomly from the set $\{2, 3, 4, 6\}$ and n is a number chosen randomly from the set $\{1, 2, 3, 4\}$, what is the probability that mn is a multiple of 12?
 a) $\frac{1}{16}$ b) $\frac{1}{8}$ c) $\frac{1}{4}$ d) $\frac{1}{2}$

- (41) If n is a positive integer and $m = 2^{n+2} + 2^n$

what is 2^{n+3} in terms of m ?

- a) m d) $\frac{8m}{5}$
 b) $\frac{2m}{5}$ d) $3m^2$

- (42) What number is 40% greater than the sum of 40 and 80?

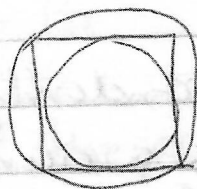
- (43) The equation $\frac{12x^2 + 6x - 23}{bx - 3} = -2x - \frac{23}{bx - 3}$

is true for all values $x \neq \frac{3}{b}$, where b is a constant.

What is the value of b ?

- A) -12
 B) -6
 C) 4
 D) 6

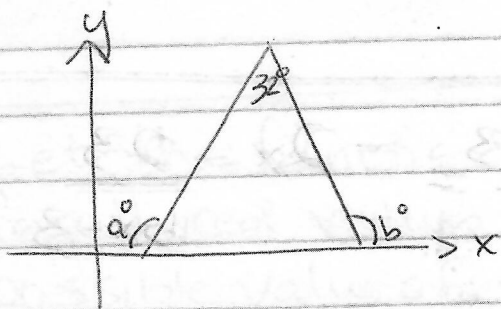
44



In the figure, a circle is inscribed in a square that is inscribed in a larger circle. If the area of the larger circle is 16.5 square units, what is the area of the smaller circle?

- 45) In the 2019 season, the Raiders had a win-to-loss ratio of $5:3$, with no game ending in a tie. If they played 120 games, how many games did they lose?
- a) 24
 - b) 36
 - c) 48
 - d) 72

46



What is the value of $a + b$?

- a) 212
- b) 238
- c) 296
- d) 328

Answer Key

Pochet #4

$$Ax + by = c$$

$$\text{slope} = \frac{-a}{b}$$

1) 3

2) 28

3) c

4) B

5) B

6) D

7) $\frac{6}{7}$

8) 1440

9) 133

10) c

11) B

12) 125

13) D

14) D

15) D

16) $70\frac{1}{8}$

17) 360

18) 66

19) b

20) c

21) c

22) D

23) B

24) D

25) $9\frac{1}{3}$

26) D

27) c

28) c

29) B

30) 0.8

31) 12

32) D

33) $\frac{5}{2}$ or 2.5

34) $\frac{7}{3}$

35) A

36) A

37) B

38) D

39) B

40) c

41) c

42) 168

43) B

44) 8.25

45) c

46) A