MOCK UPCAT 10 (MATH UPDATE): ANSWER KEY WITH SOLUTIONS

1. **D**

$3x + y = 5$ 1st equation
$2x + y = 4$ 2nd equation
Using elimination method, subtract the second equation from the first equation then eliminate y

$$\begin{array}{l} 3x + \cancel{y} = 5 \\ \underline{-(2x + \cancel{y} = 4)} \\ \quad x \quad\; = 1 \end{array}$$

Then substitute the value of x
$3x + y = 5$
$3(1) + y = 5$
$3 + y = 5$
$y = 5 - 3$
$y = 2$

Substitute the value of x and y to get x + y
$x + y = 1 + 2 = 3$

2. **B**

$\frac{x}{x-y} + \frac{y}{y-x}$
Multiply $\frac{y}{y-x}$ by -1
$\frac{x}{x-y} + -1\left[\frac{y}{y-x}\right]$
$\frac{x}{x-y} + -\frac{y}{-y+x}$
$\frac{x}{x-y} + -\frac{y}{-y+x}$
$\frac{x}{x-y} - \frac{y}{x-y}$
$\frac{\cancel{x-y}}{\cancel{x-y}} = 1$

3. **C**

$x + y = 1$ 1st equation
$3x + 2y = 5$ 2nd equation
Substitute the values of x and y to the first equation

a) (3, 2)
$x + y = 1$
$3 + 2 = 5$

Since it does not satisfy the first equation, no need to substitute the value of x to the second equation

b) (2, 3)
$x + y = 1$
$2 + 3 = 5$

Since it does not satisfy the first equation, no need to substitute to the second equation

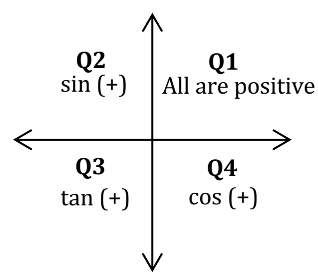
c) (3, -2)
$x + y = 1$
$3 + (-2) = 1$

Since it does satisfy the first equation, substitute to the second equation
$3x + 2y = 5$
$3(3) + 2(-2) = 5$
$5 = 5$

No need to check letter d, the answer is C.

4. **B**

$\tan\theta < 0$ and $\cos\theta < 0$



Since $\tan\theta$ and $\cos\theta$ are both negative, the remaining possible quadrant where the θ lies is at quadrant 2 or when $\sin\theta$ is positive.

5. **A**

x and y are integers
$\frac{x}{y}$ is negative
There are two cases:
1. x is positive and y is negative
2. x is negative and y is positive

I) xy
if x = + and y = −
$(+)(-) = -$

if $x = -$ and $y = +$
$(-)(+) = -$

II) $x - y$
if $x = +$ and $y = -$
$(+) - (-) = +$
if $x = -$ and $y = +$
$(-) - (+) = -$

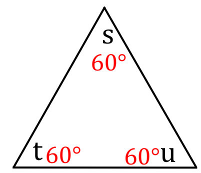
III) $x^5 + y^5$
Use **S**imple **E**xample **(SE)**
If $x = -1$ and $y = 1$
$x^5 + y^5$
$(-1)^5 + (1)^5 = -1 + 1 = 0$
0 is neither positive nor negative. It is an arbitrary number.

6. **D**
x is between -5 and 7
use **SE**
x = 0, 0 is the best SE between -5 and 7
Substitute the value of x
a) $x = 0$
b) $x + 5 = 0 + 5$
c) $x^2 + 15 = 0^2 + 15 = 15$
d) $x^2 + 30 = 0^2 + 30 = 30$
e) $3x + 10 = 3(0) + 10 = 10$
$x^2 + 30$ has the greatest value

7. **C**
Factor out $x^2 + 8x - 48 = 0$
$(x + 12)(x - 4) = 0$
$(x + 12) = 0$ and $(x - 4) = 0$
The set of roots of $x^2 + 8x - 48 = 0$ is $\{-12, 4\}$.

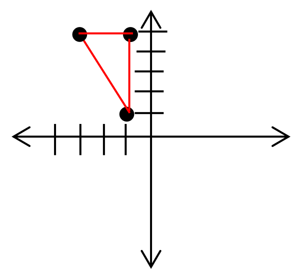
8. **E**
$(4.8x10^{-12})(0.8x10^{-20}) = N$
$(3.84x10^{-32}) = N$

9. **D**

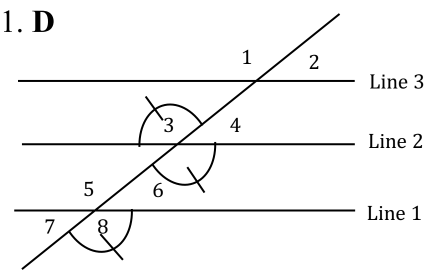


equilateral: all sides are equal
equiangular: all angles are equal
The sum of the angles of a triangle is 180°.

10. **C**
Plot the points (-1,5), (-1,1), and (-3,5) on the cartesian plane as vertices of a triangle.

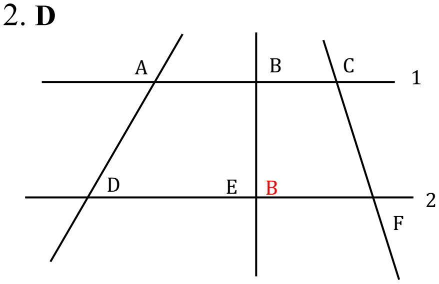


11. **D**



Line 3 and 8 are vertical angles.

12. **D**



a) $\angle A \cong \angle E$ FALSE
b) $\angle C \cong \angle F$ FALSE
c) $m\angle D + m\angle E = 90°$ FALSE
d) $m\angle B + \angle E = 180°$ TRUE

$\angle B$ and $\angle E$ are supplementary angles

e) $m\angle D + m\angle F = 180°$ FALSE

13. **A**

To get the number of posts needed, divide 114m by 6cm,

$$\frac{114}{6} = 19$$

Subtract 1 from 19 because 1st post and last post are not connected.

$19 - 1 = 18$ posts

14. **C**

$495 = \ 100\%P + 10\%P$

$$495 = P + \frac{10}{100}P$$

$$495 = \frac{100}{100}P + \frac{10}{100}P$$

$$495 = \frac{110}{100}P$$

$$\frac{10}{11}\left[\overset{45}{495} = \frac{11}{10}\ P\right]\frac{10}{11}$$

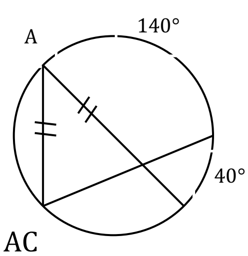
Get the 10% of 450

450 x 0.10 = 45

450 – 45 = 405

The salesman should have sold the book at ₱405.00.

15. **A**



$AB = AC$

$\widehat{AE} \ = 140°$

$\widehat{ED} \ = 40°$

$$\angle B = \frac{1}{2} m\widehat{AE}$$

$\angle B = \frac{1}{2}(140°)$

$\angle B = 70°$

Since $AB = AC$, $\triangle ABC$ is an isosceles triangle. The bases of $\triangle ABC$ are also equal.

Since the sum of the angles of a triangle is 180°,

$\angle A = 180 - 70 - 70 = 40°$

$\widehat{BD} = 2 \text{ x } m\angle A$

$\widehat{BD} = 2 \text{ x } 40°$

$\widehat{BD} = 80°$

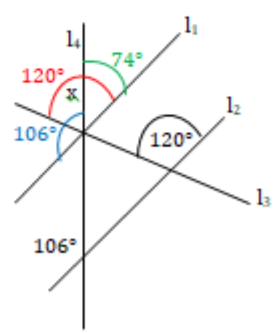
One complete rotation of a circle is 360°.

To get the measurement of $\widehat{AB} = 360 - m\widehat{AE}$

$m\widehat{ED} - \ m\widehat{BD} = 360 - 140 - 40 - 80 = 40°$

$\widehat{AB} \ = 40°$

16. **A**



$$\angle x = 120 - 74 = 46°$$

17. **D**

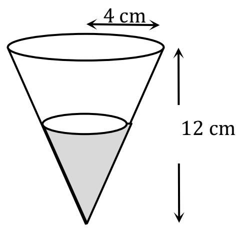
Since n is a positive number, the problem can be translated into this equation,

$$\frac{(n)(n)}{n + \cdots + n}$$

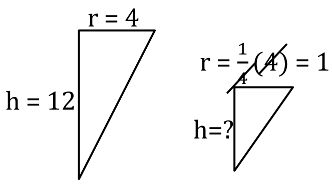
wherein n+...+n has n terms. We can simply rewrite it as

$$\frac{n^2}{n(n)} = \frac{n^2}{n^2} = 1$$

18. **A**



The radius of the water is ¼ of that of the cone.



To get the height of the water, use Ratio and Proportion (RAP)

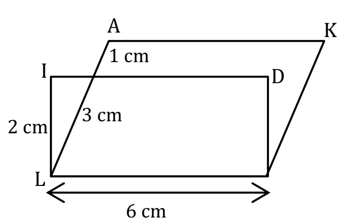
$$\frac{4}{12} = \frac{1}{h}$$
$$\frac{4h}{4} = \frac{12}{4}$$
$$h = 3$$

The height of the water is 3. Now use the formula to get the volume of a cone to get the volume of the water.

$$r = 1$$
$$h = 3$$
$$V_{cone} = \frac{\pi r^2 h}{3}$$
$$V_{cone} = \frac{\pi(1)^2(3)}{3}$$
$$V = \pi cm^3$$

The volume of the water inside the cone is πcm^3.

19. **B**



$$A_{RectangleLODI} = 12cm^2$$

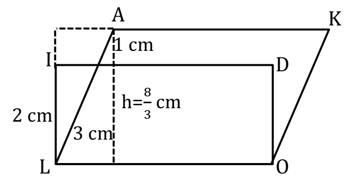
$$l \text{ x } w = 12cm^2$$

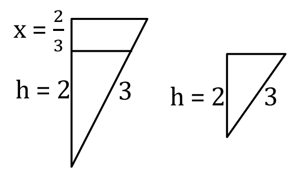
$$l \text{ x } 2 = 12$$

$$\frac{2L}{2} = \frac{12}{2}$$

$$L = 6$$

Create a right triangle





Using the concept of similar triangle by apply Ratio and Proportion (RAP)

$$\frac{2}{3} = \frac{x+2}{4}$$

$$8 = 3x + 6$$

$$8 - 6 = 3x$$

$$\frac{2}{3} = \frac{3x}{3}$$

$$x = \frac{2}{3}$$

To get the height,

$$h = \frac{2}{3} + 2$$

$$h = \frac{2+6}{3} = \frac{8}{3}$$

$$A_{ParallelogramLOKA} = b \text{ x } h$$
$$A_{ParallelogramLOKA} = 6 \text{ x } \frac{8}{3}$$
$$A_{ParallelogramLOKA} = 16cm^2$$

20. **B**

$P(twins_{GIRLS}) = 0.42$

$P(twins_{BOYS}) = 0.30$

The three possible cases are:

1) The twins are two boys.
2) The twins are two girls.
3) The twins are one girl and one boy.

The probability of having twins is 1.

$P(twins) = 1$

To get the probability that there are one boy and one girl is,

$$P(twins_{EitherBoyOrGirl}) = P(twins) - P(twins_{GIRLS}) - P(twins_{BOYS})$$

$$P(twins_{EitherBoyOrGirl}) = 1 - 0.42 - 0.30 = 0.28$$

The probability that there are one boy and one girl is 0.28.

21. **D**

$P(1,1)$

$Q(2, y)$

The slope of line PQ is d.

m = d

To get the value of y, use "two-point slope form"

$y_2 - y_1 = m\,(x - x_1)$

$P(1,1)\ P(x_1, y_1)$

$Q(2, y)\ Q(x_2, y_2)$

$y - 1 = d\,(2 - 1)$

$y = 2d - d + 1$

$y = d + 1$

The value of y is $d + 1$.

22. **D**

Use synthetic division especially when coefficients are involved.

-2	1	0	r	0	-8	40
		-2	4	-8-2r	16+4r	-16-8r
	1	-2	4+r	-8-2r	8+4r	24-8r

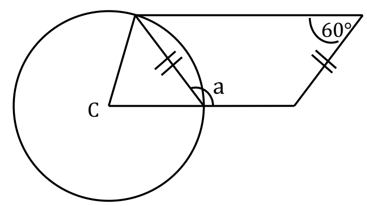
$24 - 8r = 0$

$\frac{-8r}{-8} = \frac{-24}{-8}$

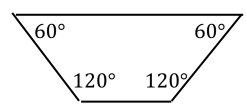
$r = 3$

The value of *r* is 3.

23. **B**



Since we have a trapezoid where two sides are equal,



The sum of the angles of a trapezoid is 360°.

$360 - 60 - 60 = 360 - 120 = 240$

$m\angle a = \frac{1}{2}(240)$

$m\angle a = 120°$

$\frac{1}{2} m\angle a = \frac{120}{2} = 60°$

The measure of half of $\angle a$ is 60°.

24. **C**

Symmetry	Test of Symmetry
x-axis	f(-y) = f(y)
y-axis	f(-x) = f(x)
At the origin	f(-x) = -f(x)
Diagonal	f(x ⟶ y) = f(y ⟶ x)

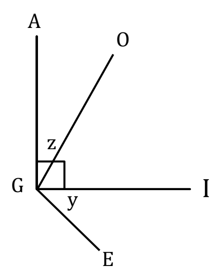
Test of Symmetry

$y = f(x) = \frac{-2}{x^3}$

$f(-x) = \frac{-2}{(-x)^3} = \frac{-2}{-x^3} = \frac{2}{x^3} = -f(x)$

The function has symmetry at the origin.

25. **E**



$\angle OGI = a$

$\angle AGE = b$

$\angle z = 90 - a$

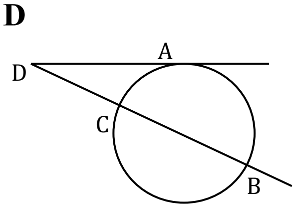
$\angle y = b - 90$

$z - y = (90 - a) - (b - 90)$

$z - y = 90 - a - b + 90$

$z - y = 180 - a - b$

26. **D**



To get the measurement of $\widehat{AC}$,

$\angle ADB = \frac{1}{2}(\widehat{AB} - \widehat{AC})$

$2\left[20 = \frac{1}{2}(160 - \widehat{AC})\right]2$

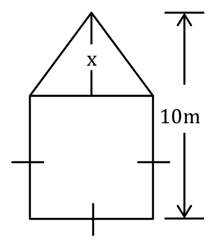
$40 = 160 - \widehat{AC}$

$\widehat{AC} = 160 - 40$

$\widehat{AC} = 120°$

The measurement of $\widehat{AC}$ is 120°.

27. **A**



$Area_{square} + Area_{triangle} = 48m^2$

$s^2 + \frac{bh}{2} = 48m^2$

$(10 - x)^2 + \frac{(10 - x)(x)}{2} = 48$

$2\left[100 - 20x + x^2 + \left(\frac{10x - x^2}{2}\right) = 48\right]2$

$200 - 40x + 2x^2 + 10x - x^2 = 96$

$2x^2 - x^2 - 40x + 10x + 200 - 96 = 0$

$x^2 - 30x + 104 = 0$

$(x - 26)(x - 4) = 0$

$(x - 26) = 0 \quad (x - 4) = 0$

$x = 26 \quad x = 4$

The value of x is 4m. It is not possible to be 26m because the total height of the figure is just 10m.

28. **A**

$P(GIRL) = \frac{9}{20}$

Let x be the number of girls

$\frac{9}{20} = \frac{x}{120}$

$\frac{1080}{20} = \frac{20x}{20}$

$54 = x$

There are 54 girls.

Let N be the number of students from NAGA

Let M be the number of students from MAYON

$$\frac{1}{3}\text{N} + \frac{1}{2}\text{M} = 54$$

$$\text{N} + \text{M} = 120$$

$$\text{M} = 120 - \text{N}$$

$$6\left[\frac{1}{3}\text{N} + \frac{1}{2}(120 - \text{N}) = 54\right]6$$

$$2\text{N} + 3(120 - \text{N}) = 324$$

$$2\text{N} + 360 - 3\text{N} = 324$$

$$-\text{N} = 324 - 360$$

$$-\text{N} = -36$$

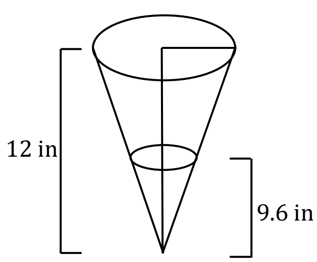
$$\text{N} = 36$$

To get the probability that a student from NAGA will be randomly chosen:

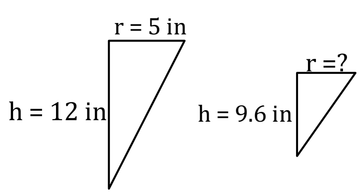
$$\text{P(NAGA)} = \frac{\text{N}}{120} = \frac{36}{120} = \frac{3}{10} = 0.3$$

The probability that a student from NAGA will be randomly chosen is 0.3.

29. **B**



To get the radius of the water, use Ratio and Proportion (RAP)



$$\frac{5}{12} = \frac{\text{r}}{9.6}$$

$$\frac{48}{12} = \frac{12\text{r}}{12}$$

$$4 = \text{r}$$

To get the area of the circular surface of the water, use the formula to get the area of circle where r = 4.

$$A_{circle} = \pi r^2$$

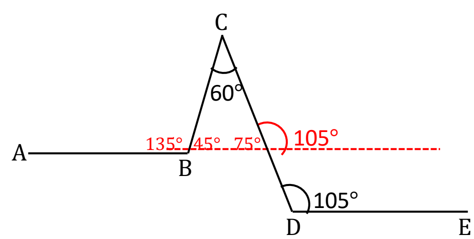
$$A_{circle} = \pi(4)^2$$

$$A_{circle} = 16\pi \text{ in}^2$$

The area of the circular surface of the water is $16\pi \text{ in}^2$.

30. **C**

Extend $\overline{AB}$



The measurement of ∠ABC is 135°.

31. **D**

Take note that the given numbers are the first 100 odd numbers, it means that it is all odd numbers from 1 – 199 and these numbers form an arithmetic sequence. Thus, applying the formula:

$$sum = \left(\frac{1st + last}{2}\right)n$$

$$sum = \left(\frac{1 + 199}{2}\right)100$$

$$sum = \left(\frac{1 + 199}{2}\right)100$$

$$sum = (100)100$$

$$sum = \mathbf{10,000}$$

32. **B**

Let us just use the formula of an arithmetic sequence.

$A_n = A_1 + (n-1)d$

$A_7 = 2 + (7-1)\left(\frac{1}{2}\right)$

$A_n = 2 + 6\left(\frac{1}{2}\right)$

$A_n = \mathbf{5}$

33. **C**

Let M be a male person

Let >20 be a person having an age greater than 20

$$P(M \cup > 20) = P(M) + P(> 20) - P(M \cap > 20)$$

$$= \frac{3}{4} + \frac{3}{4} - \frac{3}{4} = \mathbf{\frac{3}{4}}$$

34. **D**
This is a permutation problem since order is important.

$${}_8P_3 = \frac{8!}{(8-3)!} = \frac{8!}{5!} = \frac{8x7x6x5!}{5!} = 8x7x6 = \mathbf{336}$$

35. **C**

This is a permutation problem since we are talking about arrangements, thus order is important. Since there is a restriction, we need to be cautious in answering.

We will make A & B as one entity since they are must be beside each other, same as D & E, resulting to a scenario that arranges 3 objects only. The formula for that is

3 x 2 x 1 = 6

But we need to take account that the merged A & B can change places so we will multiply the previous answer to 2!. And since D & E were considered to be one as well, we will multiply the new answer by 2! again.

Final solution is given by (3 x 2 x 1) x 2! x 2! = 6 x 2 x 2 = **24**.

36. **D**

We need to solve the values of x.

Let us express first the equation into a single trigonometric variable, we will use the identity $\sin^2 x + \cos^2 x = 1$, manipulating this equation we can get $\cos^2 x = 1 - \sin^2 x$.

Substituting,

$$2(1 - \sin^2 x) - \sin x = 1$$

$$2 - 2\sin^2 x - \sin x = 1$$

$$1 - \sin x - 2\sin^2 x = 0$$

Let y be sin x,

$$1 - y - 2y^2 = 0$$

$$(1-2y)(1+y) = 0$$

$$(1-2y) = 0\ ;\ (1+y) = 0$$

$$y = \frac{1}{2};\ y = -1$$

Substituting back the value of y,

$$\sin x = \frac{1}{2}; \sin x = -1$$

Since the values of x must come from the interval $[0.2\pi)$, we need to find all values of x that will satisfy the sin equation in this interval only. When is $\sin x = \frac{1}{2}$, it is when $x = \frac{\pi}{6}, \frac{5\pi}{6}$. When is $\sin x = -1$, it is when $x = \frac{3\pi}{2}$. **Based on the choices, we can say**

that D is the only one that does not satisfy the given equation.

37. **A**

Simplify first the expression equal to f(x)) before plugging in the expression of g(x)

$$f(x) = \frac{x-1}{x^2-1} = \frac{\cancel{x-1}}{\cancel{(x-1)}(x+1)} = \frac{1}{x+1}$$

Thus,

$$f(g(x)) = \frac{1}{g(x)+1} = \frac{1}{\frac{6x-9}{2x+1}+1}$$

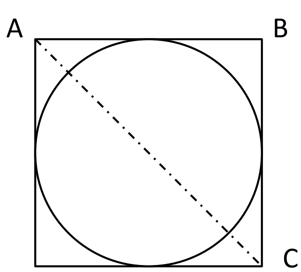
$$= \frac{1}{\frac{6x-9}{2x+1}+\frac{2x+1}{2x+1}} = \frac{1}{\frac{6x-9+2x+1}{2x+1}}$$

$$= \frac{1}{\frac{8x-8}{2x+1}}$$

$$= \boldsymbol{\frac{2x+1}{8x-8}}$$

38. **A**

This figure is easier to solve if we make it to of it and combine to form a square since the triangle is an isosceles right triangle (half of a square).



Thus, we can say that the area inside the triangle but outside the semi-circle in the original figure is half the area of the difference of the square having a diagonal of $4\sqrt{2}$ and a circle having a diameter of 4 (4 is the side of the square having a diagonal of $4\sqrt{2}$; it is a property of a square that the diagonal is $s\sqrt{2}$).

$$A = \frac{1}{2}\left(A_{square} - A_{circle}\right)$$

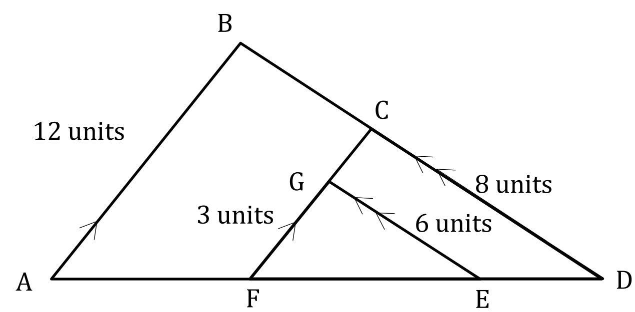
$$A = \frac{1}{2}(s^2 - \pi r^2)$$

$$A = \frac{1}{2}(4^2 - (\pi)2^2)$$

$$A = \frac{1}{2}(16 - 4\pi)$$

$$\boldsymbol{A = 8 - 2\pi}$$

39. **E**



Let us look at ΔFCD and ΔFGE first since they are similar triangles. Using RAP, we can say that:

$$\frac{FC}{FG} = \frac{CD}{GE}$$

$$\frac{FC}{3} = \frac{8}{6}$$

$$FC = 4$$

Since we now know the measure of FC, we now find the measure of BD so that we can solve BC by subtracting the measure of CD from BD. We will use the ΔABD and ΔFCD since they are similar triangles as well.

$$\frac{BD}{CD} = \frac{AB}{FC}$$

$$\frac{BD}{8} = \frac{12}{4}$$

$$BD = 24$$

Therefore, BC = BD – CD = 24-8 = **16 units**

40. **E**

If you are given an equilateral triangle circumscribed in a circle, there is a formula $r = \frac{s}{\sqrt{3}}$ wherein r is the radius of a circle and s is the side of the equilateral triangle.

Given R as the radius of the circle, we can say that $s = R\sqrt{3}$. Thus, the perimeter is

$$\boldsymbol{P = 3s = 3\left(R\sqrt{3}\right) = 3\sqrt{3}\,R.}$$

41. **B**

2, 3, 5, 7

I. Non-repeating
2 x 1 x 1 = 2

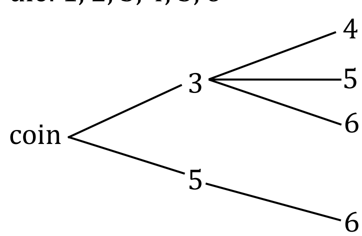
7 3 5 735 is divisible by 3 and 5
3 7 5 375 is divisible by 3 and 5

II. Order is important; though answer is in I (2). To know if the number is divisible by 15, it should be divisible by 3 and 5.

The number is divisible by 5 if it ends with 0 or 5 while it is divisible by 3 if the sum of the digit is multiple of 3.

42. **D**

die: 1, 2, 3, 4, 5, 6



$$Probability(die > coin) = \frac{desired}{total} = \frac{4}{12}$$
$$= \boldsymbol{\frac{1}{3}}$$

43. **B**

x and y are elements of integers (z)

Given: x < 8
7 < 8
7 is the largest value of x that is less than 8

Given: x – y > 2
7 – y > 2
7 – 2 > y
5 > y
5 > 4
4 is the largest value of y

(substitute x = 7 and y = 4)
Largest value of x + y is
7 + 4 = 11

44. **A**

ra = sa + t a = ?
ra – sa = t
a(r – s) = t factor out a

$$\frac{a\,(r-s)}{(r-s)} = \frac{t}{r-s}$$

a = $\boldsymbol{\frac{t}{r-s}}$

45. **C**

x-intercept = ?

$$y = \frac{-11x}{3} + 24$$

Let $y = 0$

$$0 = \frac{-11x}{3} + 24$$

$$\frac{3}{11}\left[\frac{11x}{3} = 24\right]\frac{3}{11}$$

$$\boldsymbol{x = \frac{72}{11}}$$

46. **D**

$$m = \frac{-1}{3}$$

$$m = \frac{(y_2 - y_1)}{(x_2 - x_1)}$$

$$\frac{(y_2 - y_1)}{(x_2 - x_1)} = \frac{-1}{3}$$

$$\frac{y_2 - 0}{x_2 - 0} = \frac{-1}{3}$$

$$\frac{y_2}{x_2} = \frac{-1}{3} = \frac{-2}{6}$$

$x_2 = 6$ and $y_2 = -2$

The point is **(6, −2).**

47. **B**

$(12c^4 - 4c^3 + 8c) \div 4c$

Use cancellation $\frac{12c^4}{4c} - \frac{4c^3}{4c} + \frac{8c}{4c}$ = **$3c^3 - c^2 + 2$**

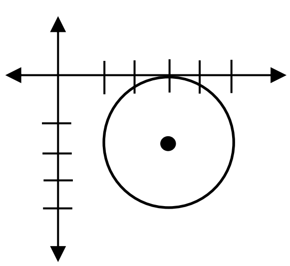
48. **A**

$(5r^2s + 4rs^2 - 8rs + 15)$
$-r\,(3rs + s^2 - 5s)$
(distribute −r)

$5r^2s + 4rs^2 - 8rs + 15$
$-3r^2s - rs^2 + 5rs$

$2r^2s + 3rs^2 - 3rs + 15$

49. **B**



center (h, k): (3, −2)
radius: 2

Use the general form of a circle:
$(x-h)^2 + (y-k)^2 = r^2$

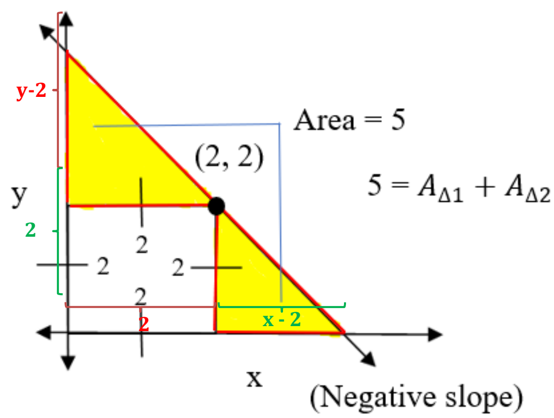
$(x-3)^2 + (y+2)^2 = 2^2$
$x^2 - 6x + 9 + y^2 + 4y + 4 = 4$
$x^2 - 6x + 9 + y^2 + 4y = 4 - 4$ (transpose 4)
$x^2 - 6x + 9 + y^2 + 4y = 0$
$x^2 + y^2 - 6x + 4y + 9 = 0$ (rearrange the terms)

50. **E**

$$\frac{(-3x^6y^5)^2}{-3x^2y^2} = \text{ distribute 2}$$

Use cancellation $\frac{9x^{12}y^{10}}{-3x^2y^2} = \mathbf{-3x^{10}y^8}$

51. **C**



Total area = 9
Area of the square = 4
Area of the shaded region = 5

total area – area of the square
= area of the shaded region
9 – 4 = 5

$A_{\Delta 1} + A_{\Delta 2} = 5$

$$\frac{bh}{2} + \frac{bh}{2} = 5$$

$$\frac{2(y-2)}{2} + \frac{(x-2)(2)}{2} = 5$$

$$(y-2) + (x-2) = 5$$
$$y + x = 5 + 2 + 2$$
$$\mathbf{y + x = 9 \text{ or } x + y = 9}$$

52. **D**

$$\cos^{-1}\left(\frac{1}{2}\right) \text{ where } \theta \in \left(0, \frac{\pi}{2}\right]$$

$$\cos\theta = \frac{1}{2}$$

$$\theta = \cos^{-1}\left(\frac{1}{2}\right) = 60°$$

$\theta = 60°$ **convert to pi radian**

$$\theta = \cancel{60} \times \frac{\pi}{\cancel{180}} = \frac{\pi}{3}$$

53. **A**

Using Ratio and Proportion (RAP)

Let ? be the cost of y mangoes

$$\frac{cost}{no. of\ mangoes} = \frac{?}{y} = \frac{d}{x}$$

$$\frac{?}{y} = \frac{d}{x}$$

$$? = \boldsymbol{\frac{dy}{x}}$$

54. **D**

If x > 4, look for the least value
Using Simple Example (SE), x = 5

a. $\frac{4}{x} = \frac{4}{5}$
~~b. $\frac{x}{4} = \frac{5}{4}$~~ eliminated
~~c. $\frac{4}{x-2} = \frac{4}{5-2} = \frac{4}{3}$~~ eliminated
d. $\frac{4}{x+2} = \frac{4}{5+2} = \frac{4}{7}$
~~e. $\frac{x+2}{4} = \frac{5+2}{4} = \frac{7}{4}$~~ eliminated

Eliminate all the improper fractions because their values are always greater than 1.

Compare $\frac{4}{5}$ and $\frac{4}{7}$

If the fractions have the same numerators, the greater the denominator, the lesser the value of the fraction. Therefore, $\boldsymbol{\frac{4}{7}}$ **is the least**.

55. **C**

zeroes of $f(x) = 72x^2 - 9x$

$72x^2 - 9x = 0$
$9x(8x - 1) = 0$
$9x = 0$ $\quad$ $8x - 1 = 0$
$\boldsymbol{x = 0}$ $\quad$ $8x = 1$
$\boldsymbol{x = \frac{1}{8}}$

The zeroes of $f(x) = 72x^2 - 9x$ are **0** and $\boldsymbol{\frac{1}{8}}$.

56. **D**

Using Elimination Method

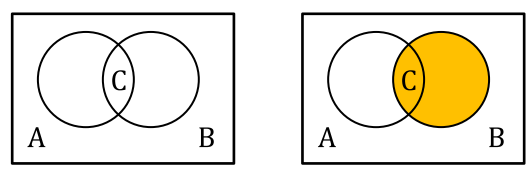
$$x + \cancel{y} = 6p$$
$$+ \quad x - \cancel{y} = 8q$$

$$\frac{2x}{2} = \frac{6p + 8q}{2}$$

$$\boldsymbol{x = 3p + 4q} \text{ or } \boldsymbol{4q + 3p}$$

57. **B**

A ∩ B = C
(A∩C) ∪ B = ?



(A ∩ C) ∪ B = C ∪ B = B

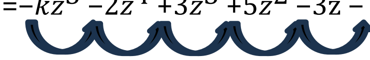
58. **E**

Use Decarte's Rule of Sign

(k is negative)

Positive roots

$P(z) = -kz^5 - 2z^4 + 3z^3 + 5z^2 - 3z - 8$



x ✓ x ✓ x

(put a ✓ if there is a change in sign and x if there's none)

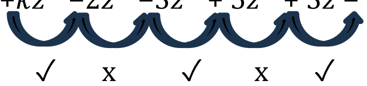
To get the number of positive root(s), count the number of ✓; then subtract 0.

Number of positive roots: 2 or 0

Negative roots

$P(-z) = -k(-z)^5 - 2(-z)^4 + 3(-z)^3 + 5(-z)^2 - 3(-z) - 8$

$= +kz^5 - 2z^4 - 3z^3 + 5z^2 + 3z - 8$



To get the number of negative root(s), count the number of ✓; then subtract 0.

Number of negative roots: 3 or 1

59. **D**

$f(x) = 7x - 5$

$g\ (\mathrm{x}) = 2\mathrm{x} + 3$

$g\ [f(x)] = 2\ (7x - 5) + 3$

$g\ [f(x)] = 14x - 10 + 3$

$\boldsymbol{g\ [f(x)] = 14x - 7}$

60. **D**

Using Pythagorean Triple (5, 12, 13)

(5x100, 12x100, 13x100)
= (500m, 1200m, **1300m**)