SOLUTIONS MATHEMATICS IGCSE P2 V2

Q. No. 1:

a) 1) From the first equation, we can isolate n:

$$n = 3m - 5$$

Now, substitute this expression for n into the second equation:

$$2m + 5(3m - 5) = 7$$

$$m = \frac{32}{17} = 1.8824$$

$$n = 5.64$$

So, the solution to the first system is m ≈ 1.8824 and n ≈ 5.6471.

2) From the first equation, we can isolate x:

$$x = -2(y - 6)$$

$$x = -2y + 12$$

Now, substitute this expression for x into the second equation:

$$3(-2y + 12) + 4y = 30$$

$$y = 3$$

Now that we have the value of y, we can substitute it back into the expression for x:

$$x = -2(3) + 12$$

$$x = 6$$

So, the solution to the second system is x = 6 and y = 3.

b) 1) From the second equation, we can express x in terms of y:

$$x = 10 - 6y$$

Now, substitute this expression for x into the first equation:

$$3(10 - 6y) - 4y = 19$$

$$y = 0.5$$

Now that we have the value of y, we can substitute it back into the expression for x:

$$x = 10 - 6(0.5)$$

$$x = 7$$

So, the solution to the first system is x = 7 and y = 0.5.

2) From the first equation, we can express n in terms of m:

$$n = 2m - 6$$

Now, substitute this expression for n into the second equation:

$$2m + 3(2m - 6) = -6$$

$$m = 1.5$$

Now that we have the value of m, we can substitute it back into the expression for n:

$$n = 2(1.5) - 6$$

$$n = -3$$

So, the solution to the second system is m = 1.5 and n = - 3.

c) Simplify the numerator and denominator:

Numerator:

$$2(2a) + 3a = 4a + 3a = 7a$$

Denominator:

$$5(2a) + 2(-a) = 10a - 2a = 8a$$

Now, substitute these simplified values back into the expression:

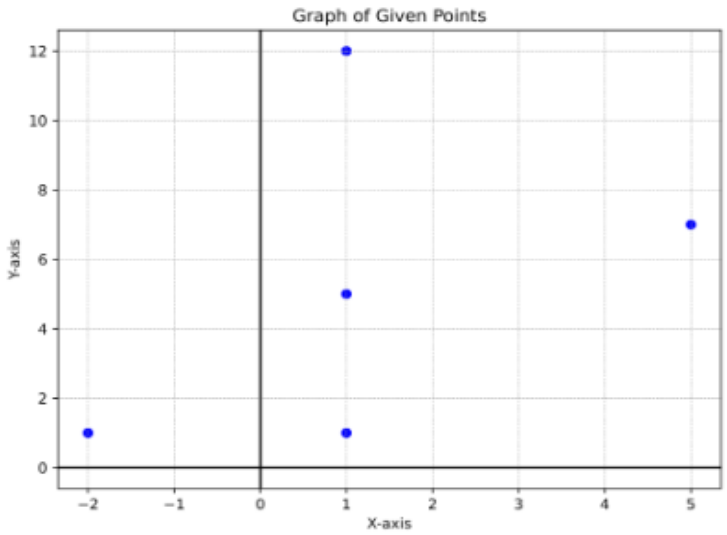
$$\frac{7a}{8a}$$

Simplify by dividing both the numerator and denominator by a:

$$\frac{7}{8}$$

Q. No. 2:

a)



b) To find the y-intercept of each point, we look at the point's coordinates. The y-intercept is the value of y when x is zero. Therefore:

(1,12): y-intercept is 12

(1,7): y-intercept is 7

(1,5): y-intercept is 5

(5,7): y-intercept is 7

(-2,1): y-intercept is 1

c) Writing down the equations of the points:

(1,12): y = 12

(1,7): y = 7

(1,5): y = 5

(5,7): y = 7

(-2,1): y = 1

Q. No. 3:

Polygons are two-dimensional closed shapes made up of straight lines. They are classified based on the number of sides they have. Here are some common polygons and their properties:

1. **Triangle:** A polygon with three sides. The sum of the interior angles of a triangle is always 180 degrees.
2. **Quadrilateral:** A polygon with four sides. The sum of the interior angles of a quadrilateral is always 360 degrees.
3. **Pentagon:** A polygon with five sides. The sum of the interior angles of a pentagon is always 540 degrees.
4. **Hexagon:** A polygon with six sides. The sum of the interior angles of a hexagon is always 720 degrees.
5. **Heptagon:** A polygon with seven sides.
6. **Octagon:** A polygon with eight sides.
7. **Nonagon:** A polygon with nine sides.
8. **Decagon:** A polygon with ten sides.
9. **Regular polygon:** A polygon with all sides of equal length and all angles of equal measure.
10. **Convex polygon:** A polygon in which all interior angles are less than 180 degrees. The diagonals of a convex polygon lie entirely inside the polygon.
11. **Concave polygon:** A polygon in which at least one interior angle is greater than 180 degrees. The diagonals of a concave polygon may lie partially or entirely outside the polygon.
12. **Interior angles:** Angles inside the polygon formed by adjacent sides.
13. **Exterior angles:** Angles formed by extending one side of the polygon and an adjacent side. The sum of the exterior angles of any polygon, convex or concave, is always 360 degrees.

Q. No. 4:

a) Between 5 and 7 seconds into its journey, the car is maintaining a constant speed. This is indicated by the horizontal line on the graph during that time interval.

b) The rate of change of speed during the first 5 seconds can be determined by the slope of the graph from 0 to 5 seconds. It appears to be a straight line, so the rate of change of speed is constant. To calculate the exact rate, you would take the change in speed and divide it by the change in time over that interval.

c) The term that describes the rate of change of speed is acceleration.

Q. No. 5:

To find the other trigonometric function values of β, we can use the given information that sin(β) = 6/7 and the fact that β is an acute angle (meaning it is between 0 and 90 degrees).

Given sin(β) = 6/7, we can use the Pythagorean identity to find the missing side of a right triangle:

$\cos(\beta) = \pm\sqrt{(1 - \sin^2(\beta))}$

$\cos(\beta) = \pm\sqrt{(1 - (6/7)^2)}$

$\cos(\beta) = \pm\sqrt{(1 - 36/49)}$

$\cos(\beta) = \pm\sqrt{(13/49)}$

$\cos(\beta) = \pm\sqrt{13} / 7$

Since β is an acute angle, cosine is positive in the first quadrant. Therefore, $\cos(\beta) = \sqrt{13} / 7$.

Now, we can find the other trigonometric function values:

$\sin(\beta) = 6/7$ (given)

$\cos(\beta) = \sqrt{13} / 7$ (calculated above)

$\tan(\beta) = \sin(\beta) / \cos(\beta) = (6/7) / (\sqrt{13} / 7) = 6 / \sqrt{13} = 6\sqrt{13} / 13$

$\cot(\beta) = 1 / \tan(\beta) = 13 / 6\sqrt{13} = \sqrt{13} / 6$

$\sec(\beta) = 1 / \cos(\beta) = 1 / (\sqrt{13} / 7) = 7 / \sqrt{13} = 7\sqrt{13} / 13$

$\csc(\beta) = 1 / \sin(\beta) = 1 / (6/7) = 7 / 6$

So, the trigonometric function values of β are:

$\sin(\beta) = 6/7$

$\cos(\beta) = \sqrt{13} / 7$

$\tan(\beta) = 6\sqrt{13} / 13$

$\cot(\beta) = \sqrt{13} / 6$

$\sec(\beta) = 7\sqrt{13} / 13$

$\csc(\beta) = 7 / 6$

Q. No. 6:

a) In a regular hexagon, each interior angle measures 120 degrees. Therefore, the angle EOD is 120 degrees.

b) To find the area of triangle EOD, we need to find its height. The height of an equilateral triangle (which triangle EOD is) can be found using the formula:

$$\text{h} = \frac{\sqrt{3}}{2} \times 3\text{cm} = \frac{3\sqrt{3}}{2}\text{cm}$$

The area of triangle EOD is:

$$\text{Area of } \triangle\text{EOD} = \frac{9\sqrt{3}}{4}\text{cm}^2$$

Since the regular hexagon can be divided into six equilateral triangles, the area of the hexagon ABCDEF is six times the area of triangle EOD:

$$\text{Area of hexagon ABCDEF} = \frac{27\sqrt{3}}{2}\text{cm}^2$$

Q. No. 7:

a) $V = 6 \times 4 \times 8 = 192 \text{ cm}^3$
b) $V = 10^3 = 1000 \text{ cm}^3$
c) $V = \frac{1}{2} \times 6 \times 8 \times 10 = 240 \text{ cm}^3$
d) $V = 5 \times 3 \times 7 = 105 \text{ cm}^3$
e) $V = \pi \times 4^2 \times 12 = \pi \times 16 \times 12 = 192\pi \text{ cm}^3$
f) $V = \frac{1}{2} \times 5 \times 8 \times 10 = 200 \text{ cm}^3$

Q. No. 8:

a) To find the probability that both discs are green, we multiply the probabilities along the path where both discs are green:

$$\text{P(Both green)} = \frac{7}{10} \times \frac{6}{9} = \frac{7}{15}$$

b) To find the probability that both discs are blue, we multiply the probabilities along the path where both discs are blue:

$$\text{P(Both blue)} = \frac{3}{10} \times \frac{2}{9} = \frac{1}{15}$$