PART I
Total Value: 50%

Answer all items. Shade the letter of the correct answer on the computer scorable answer sheet.

1. What is the common difference between successive terms generated by the sequence $t_n = \frac{2}{3}n + 4$?

(A) -4
✓ (B) $\frac{2}{3}$
(C) $\frac{3}{2}$
(D) 4

2. Which represents a quadratic relationship?

(A)

x	0	1	2	3	4
y	–3	1	5	9	13

(B)

x	0	1	2	3	4
y	0	4	16	64	256

✓ (C)

x	0	1	2	3	4
y	3	4	7	12	19

(D)

x	0	1	2	3	4
y	–2	–1	6	25	62

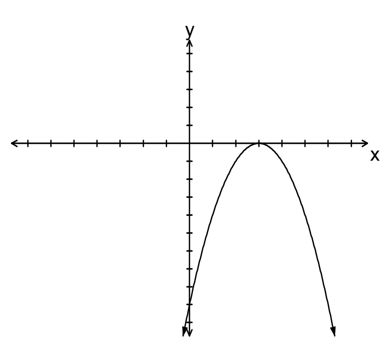
3. What is the value of D_3 for the sequence generated by $t_n = -4n^3 + 3n^2 - 2n + 1$?

✓ (A) -24
(B) -12
(C) -8
(D) -4

4. A quadratic sequence is given by $t_n = \text{a}n^2 + \text{b}n + 5$. What is the value of b if $D_2 = 6$ and $t_3 = 14$?

(A) -15
(B) -9
✓ (C) -6
(D) -3

5. What is the value of the discriminant for $f(x) = 0$ in the graph provided?



(A) -9
(B) -3
✓ (C) 0
(D) 3

6. Which represents the area of a rectangle with a perimeter of 80 m?

(A) $A = -2x^2 + 80x$
✓ (B) $A = -x^2 + 40x$
(C) $A = x^2 - 40x$
(D) $A = 2x^2 - 80x$

7. Which has the smallest vertical stretch factor when compared to $y = x^2$?

(A) $-2(y+1) = (x-3)^2$
(B) $-\frac{3}{4}(y+1) = (x-3)^2$
(C) $\frac{2}{7}(y+1) = (x-3)^2$
✓ (D) $3(y+1) = (x-3)^2$

8. Which describes the graph of $-2(y+3) = (x-1)^2$ when compared to $y = x^2$?

(A) reflected across the x-axis, vertical stretch factor of -2, translated 3 units down and 1 unit right
(B) reflected across the x-axis, vertical stretch factor of $-\frac{1}{2}$, translated 3 units up and 1 unit left
✓ (C) reflected across the x-axis, vertical stretch factor of $\frac{1}{2}$, translated 3 units down and 1 unit right
(D) reflected across the x-axis, vertical stretch factor of 2, translated 3 units up and 1 unit left

9. What is the value of $f(-3)$ for the quadratic function $f(x) = -2x^2 + 3x - 1$?

✓ (A) -28
(B) -10
(C) 8
(D) 26

10. What is the y-intercept of the function $-\frac{1}{2}(y-1) = (x+3)^2$?

(A) -20
✓ (B) -17
(C) -11
(D) -5

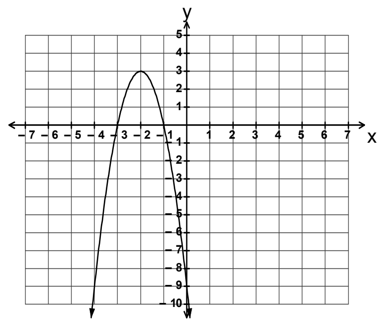
11. What is the range of $\frac{1}{a}(y+q) = (x-p)^2$ where $a < 0$?

(A) $\{y \mid y \geq -q, y \in R\}$
✓ (B) $\{y \mid y \leq -q, y \in R\}$
(C) $\{y \mid y \geq q, y \in R\}$
(D) $\{y \mid y \leq q, y \in R\}$

12. What is the value of k if $kx^2 + 5x - 6 = 0$ has a root of -2?

(A) -4
(B) -1
(C) 1
✓ (D) 4

13. What is the quadratic function for the graph provided?



(A) $-3(y-3)=(x+2)^2$
(B) $-3(y+3)=(x-2)^2$
✓ (C) $-\frac{1}{3}(y-3)=(x+2)^2$
(D) $-\frac{1}{3}(y+3)=(x-2)^2$

14. Solve: $\sqrt{2}\,x^2+\sqrt{18}=0$.

(A) $\pm\sqrt{3}$
✓ (B) $\pm i\sqrt{3}$
(C) ± 3
(D) $\pm 3i$

15. Solve: $\sqrt{2}\,x\left(\sqrt{2}\,x-3\sqrt{2}\right)=20$.

(A) $\frac{-3\pm i\sqrt{31}}{2}$
(B) $\frac{3\pm i\sqrt{31}}{2}$
(C) $-5, 2$
✓ (D) $-2, 5$

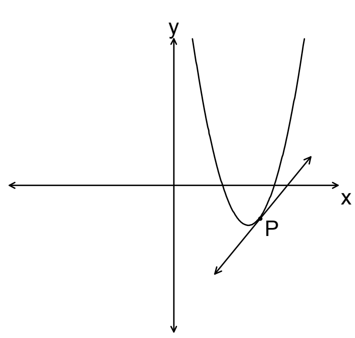
16. What is the sum of the roots of $3kx^2+kx+8=0$?

✓ (A) $\frac{-1}{3}$
(B) $\frac{1}{3}$
(C) $\frac{-8}{3k}$
(D) $\frac{8}{3k}$

17. What is (are) the possible value(s) of b if $x^2+bx+4=0$ has different real roots?

(A) $-4<b<4$
✓ (B) $b<-4$ or $b>4$
(C) $b\le -4$ or $b\ge 4$
(D) $b=4$ or $b=-4$

18. What rate of change is represented by the graph provided?



(A) negative average
(B) negative instantaneous
(C) positive average
✓ (D) positive instantaneous

19. A spherical snowball of radius 4 cm is melting uniformly. Which represents the volume, V, of the snowball if the radius decreases by 20 mm per hour, h?

(A) $V = \frac{4}{3}\pi(4-20h)^3$
✓ (B) $V = \frac{4}{3}\pi(4-2h)^3$
(C) $V = \frac{4}{3}\pi(4+20h)^3$
(D) $V = \frac{4}{3}\pi(4+2h)^3$

20. Which sequence is geometric?

✓ (A) $a^n, a^{n+1}, a^{n+2}, a^{n+3}, \ldots$
(B) $a, \frac{a}{2}, \frac{a}{3}, \frac{a}{4}, \frac{a}{5}, \ldots$
(C) $a, \frac{a^2}{2}, \frac{a^3}{4}, \frac{a^4}{6}, \frac{a^5}{8}, \ldots$
(D) $\log a, \log a^2, \log a^3, \log a^4, \ldots$

21. What is the simplest form of $(3-x^{-1})^2$?

(A) $9-\frac{1}{x^2}$
(B) $9+\frac{1}{x^2}$
✓ (C) $9-\frac{6}{x}+\frac{1}{x^2}$
(D) $9+\frac{6}{x}-\frac{1}{x^2}$

22. What is the simplified form of $\left(4x^{-3}\right)^{-\frac{1}{2}} \cdot 4x^{\frac{1}{2}}$?

(A) $2x^{-1}$
✓ (B) $2x^2$
(C) $16x^{-\frac{7}{4}}$
(D) $16x^2$

23. Which equation represents the data in the table provided?

x	-3	0	3	6	9
y	$\frac{5}{4}$	5	20	80	320

(A) $y = \frac{5}{4}(3)^{\frac{x}{4}}$
(B) $y = \frac{5}{4}(4)^{\frac{x}{3}}$
(C) $y = 5(3)^{\frac{x}{4}}$
✓ (D) $y = 5(4)^{\frac{x}{3}}$

24. Solve: $\sqrt{3}^{\,x-1} = \dfrac{1}{81}$.

✓ (A) -7
(B) -6
(C) 9
(D) 10

25. What is the range of the function $y = 20(1.8)^x + 3.4$?

✓ (A) $\{y | y > 3.4, y \in R\}$
(B) $\{y | y \geq 3.4, y \in R\}$
(C) $\{y | y > 23.4, y \in R\}$
(D) $\{y | y \geq 23.4, y \in R\}$

26. The graph of $y = 3^x + \mathrm{k}$ is translated vertically upward by 5 units. What is the equation of the horizontal asymptote for the translated graph?

(A) $y = 5$
(B) $y = \mathrm{k}$
(C) $y = \mathrm{k} - 5$
✓ (D) $y = \mathrm{k} + 5$

27. Which describes the function $y = 2(3)^{-x} + 5$?

(A) a decay function with y-intercept 5
✓ (B) a decay function with y-intercept 7
(C) a growth function with y-intercept 5
(D) a growth function with y-intercept 7

28. What is the focal point for the graph of $y = 2^{x+1} - 5$?

✓ (A) $(-1, -4)$
(B) $(0, -5)$
(C) $(1, 6)$
(D) $(2, 5)$

29. What transformations have been applied to $y = 2^x$ to result in the graph for the function $y - 1 = 2^{2x-3}$?

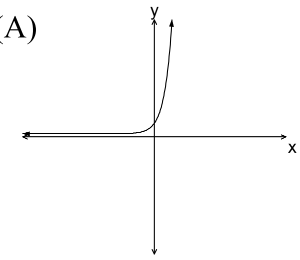
✓ (A) horizontal stretch of $\frac{1}{2}$, $\frac{3}{2}$ units to the right, 1 unit up
(B) horizontal stretch of $\frac{1}{2}$, 3 units to the right, 1 unit up
(C) horizontal stretch of 2, $\frac{3}{2}$ units to the right, 1 unit up
(D) horizontal stretch of 2, 3 units to the right, 1 unit up

30. The population of a city is increasing at a rate of 0.5 % every 6 months. If the population of the city is currently 200 000, what will it be after 60 months?

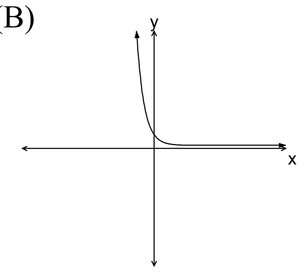
(A) 200 832
(B) 208 299
✓ (C) 210 228
(D) 325 778

31. Which is the graph of $y = \log_5 x$?

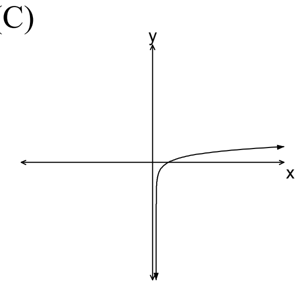
(A)



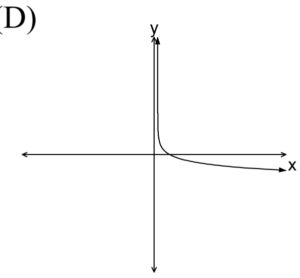
(B)



✓ (C)



(D)



32. What is the logarithmic form of $81^{\frac{3}{4}} = 27$?

(A) $\log_{\frac{3}{4}}(27) = 81$

(B) $\log_{27}\left(\frac{3}{4}\right) = 81$

(C) $\log_{27}(81) = \frac{3}{4}$

✓ (D) $\log_{81}(27) = \frac{3}{4}$

33. What is the new equation if the graph of $y = \log_2 x$ is reflected in the x-axis?

✓ (A) $y = -\log_2(x)$

(B) $y = \log_2(-x)$

(C) $2^x = y$

(D) $2^y = x$

34. What is the simplified form of $2\log_a 5 + \log_a 6 - \frac{1}{3}\log_a 8$?

(A) $\log_a 29$
(B) $\log_a 30$
✓ (C) $\log_a 75$
(D) $2\log_a 15$

35. What is the exact value of x for $(1.3)^x = 28$?

(A) $\frac{\log 1.3}{\log 28}$
(B) $\log\left(\frac{1.3}{28}\right)$
✓ (C) $\frac{\log 28}{\log 1.3}$
(D) $\log\left(\frac{28}{1.3}\right)$

36. What is the value of x for $\log_2 x + 2^3 = 0$?

(A) -3
(B) $-\frac{1}{256}$
✓ (C) $\frac{1}{256}$
(D) 3

37. What transformation of $(x-4)^2 + (y-3)^2 = 1$ produces $\left[\frac{1}{2}(x-4)\right]^2 + \left[\frac{1}{5}(y-3)\right]^2 = 1$?

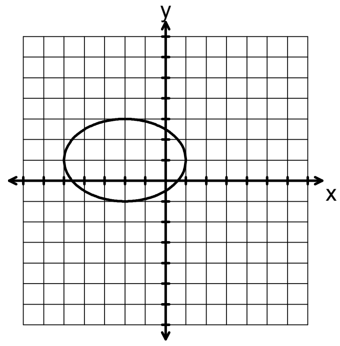
(A) horizontal stretch of $\frac{1}{2}$, vertical stretch of $\frac{1}{5}$
(B) horizontal stretch of $\sqrt{2}$, vertical stretch of $\sqrt{5}$
✓ (C) horizontal stretch of 2, vertical stretch of 5
(D) horizontal stretch of 4, vertical stretch of 25

38. What is the length of the major axis of the ellipse given by the equation $\left[\frac{1}{3}(x-1)\right]^2 + \left[\frac{1}{5}(y-3)\right]^2 = 1$?

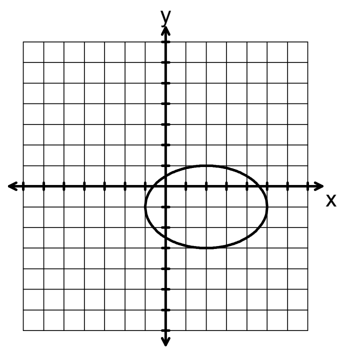
(A) 3
(B) 5
(C) 6
✓ (D) 10

39. Which is the graph of $\frac{1}{9}(x-2)^2+\frac{1}{4}(y+1)^2=1$?

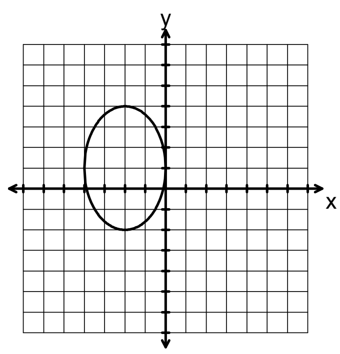
(A)



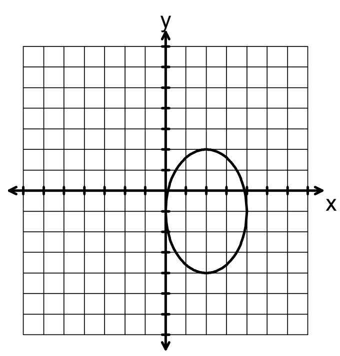
✓ (B)



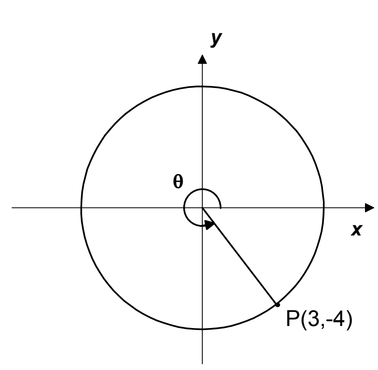
(C)



(D)



40. Which is true if point P is rotated through an angle θ from standard position as shown?



(A) $\cos\theta = -\frac{3}{5}$

✓ (B) $\cos\theta = \frac{3}{5}$

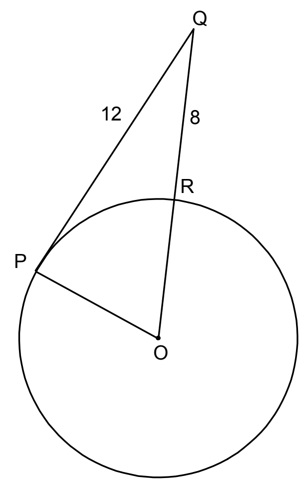
(C) $\sin\theta = -\frac{3}{4}$

(D) $\sin\theta = \frac{4}{5}$

41. Chords $\overline{AB}$ and $\overline{CD}$ are equidistant from the centre of a circle. What is the length of $\overline{CD}$ if $\overline{AB}$ has endpoints $A(-4,3)$ and $B(2,-5)$?

(A) $2\sqrt{17}$
(B) $4\sqrt{17}$
✓ (C) 10
(D) 100

42. The circle with centre O shown has tangent $\overline{PQ}=12$ and segment $\overline{QR}=8$. What is the radius of the circle?



(A) 3.5
(B) 4
✓ (C) 5
(D) 8.9

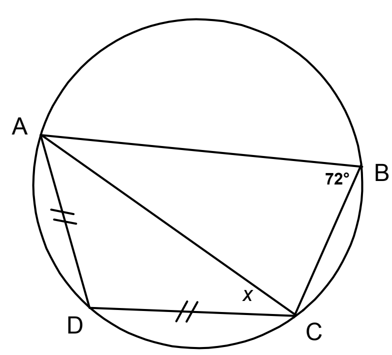
43. What is the equation of the line perpendicular to $2x+y=3$ and passing through the centre of the circle $(x+2)^2+(y-5)^2=1$?

(A) $y=-2x+1$
(B) $y=-2x+8$
(C) $y=\frac{1}{2}x+\frac{1}{2}$
✓ (D) $y=\frac{1}{2}x+6$

44. The centre of an ellipse is $(3,-1)$ and it has a major vertical axis of length 8 and a minor horizontal axis of length 6. What is the equation of the ellipse in transformational form?

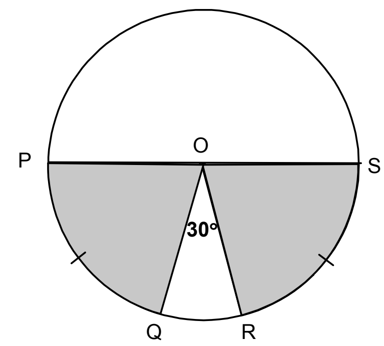
✓ (A) $\left[\frac{1}{3}(x-3)\right]^2+\left[\frac{1}{4}(y+1)\right]^2=1$
(B) $\left[\frac{1}{3}(x+3)\right]^2+\left[\frac{1}{4}(y-1)\right]^2=1$
(C) $\left[\frac{1}{6}(x-3)\right]^2+\left[\frac{1}{8}(y+1)\right]^2=1$
(D) $\left[\frac{1}{6}(x+3)\right]^2+\left[\frac{1}{8}(y-1)\right]^2=1$

45. In the circle shown, $\angle ABC = 72°$ and $\overline{AD}=\overline{DC}$. What is the value, in degrees, of $\angle ACD$?



✓ (A) 36
(B) 45
(C) 54
(D) 72

46. In the circle with centre O shown, diameter $\overline{PS} = 16$. What is the approximate total area, in square units, of the shaded regions?



(A) 42
✓ (B) 84
(C) 168
(D) 336

47. Which mapping rule transforms $(x-4)^2 + (y+2)^2 = 9$ to $(x-10)^2 + (y+2)^2 = 36$?

(A) $(x, y) \to (2x-6, 2y)$
(B) $(x, y) \to (4x-6, 4y)$
✓ (C) $(x, y) \to (2x+6, 2y)$
(D) $(x, y) \to (4x+6, 4y)$

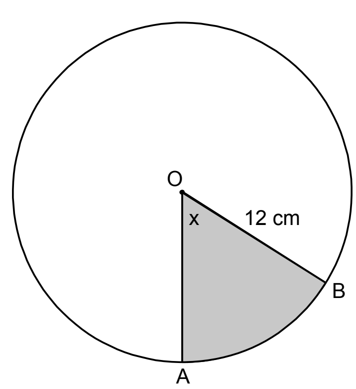
48. What is a possible value for D such that $x^2 + y^2 + Dx - 6y - 4 = 0$ represents a circle with a radius of 7?

(A) 6
✓ (B) 12
(C) 18
(D) 36

49. If a point $P(-6, 0)$ is rotated $120°$ on a circle with its centre at the origin, what are the new coordinates of P?

(A) $\left(-3, 3\sqrt{3}\right)$
(B) $\left(-\frac{1}{2}, \frac{\sqrt{3}}{2}\right)$
✓ (C) $\left(3, -3\sqrt{3}\right)$
(D) $\left(\frac{\sqrt{3}}{2}, -\frac{1}{2}\right)$

50. In the circle with centre O shown, $\overline{OB} = 12$ cm and the total perimeter of the shaded sector is $3\pi + 24$. What is the measure, in degrees, of $\angle AOB$?



(A) 7.5
(B) 21
(C) 22.5
✓ (D) 45

PART II
Total Value: 50%

Answer **ALL** items in the space provided. Show **ALL** workings.

Value

4 51. Algebraically determine the **exact** roots in simplest form for $\frac{x^2+1}{x+2} = \frac{x}{3} + \frac{6}{x+2}$.

Answer:

$\text{LCD}: 3(x+2)$ Multiply each term by LCD and cancel.

$$\frac{3(x+2)(x^2+1)}{(x+2)} = \frac{3(x+2)x}{3} + \frac{3(x+2)6}{(x+2)}$$ **0.5 marks**

$$3(x^2+1) = x^2+2x+18$$ **0.5 marks**

$$3x^2+3 = x^2+2x+18$$

$$2x^2-2x-15=0$$ **1 mark**

$$x = \frac{-b \pm \sqrt{b^2-4ac}}{2a}$$

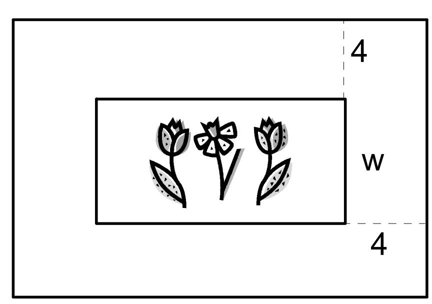
$$x = \frac{2 \pm \sqrt{(-2)^2-4(2)(-15)}}{2(2)}$$ **0.5 marks**

$$x = \frac{2 \pm \sqrt{4+120}}{4} = \frac{2 \pm \sqrt{124}}{4}$$ **0.5 marks**

$$x = \frac{2 \pm 2\sqrt{31}}{4}$$ **0.5 marks**

$$x = \frac{1 \pm \sqrt{31}}{2}$$ **0.5 marks**

4 52. A flower bed is in the shape of a rectangle and its length is twice its width. The bed is surrounded by a 4 m wide walkway. If the total area of the bed and walkway is 504 m^2, algebraically determine the width of the flower bed.



Use $l = 2w$ **0.5 marks**

$504 = (2w+8)(w+8)$ **1 mark**

$504 = 2w^2+16w+8w+64$

$504 = 2w^2+24w+64$

$0 = 2w^2+24w-440$ **1 mark**

$0 = w^2+12w-220$

$0 = (w-22)(w+10)$ **0.5 marks**

~~$w = -22$~~ $w = 10$ m

reject $w = -22$ **0.5 marks**

The width of the flower bed is 10 m. **0.5 marks**

Value

4 53. The sum of the roots for $2x^2+(\mathrm{k}-3)x+1=0$ is equal to the product of the roots for $5x^2-3x+(\mathrm{k}+1)=0$. Algebraically determine the value(s) of k.

Answer:

Sum of roots $=-\frac{b}{a}$

$=\frac{-(k-3)}{2}$ **1 mark**

Product of roots $=\frac{c}{a}$

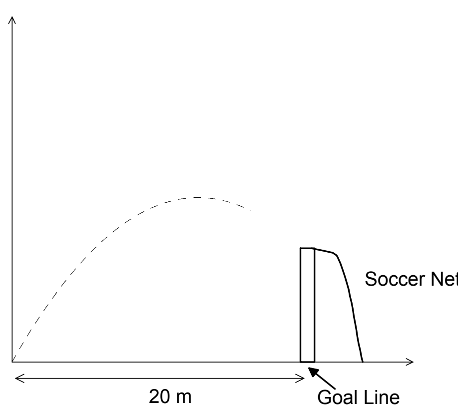
$=\frac{k+1}{5}$ **1 mark**

$\frac{-(k-3)}{2}=\frac{k+1}{5}$ **1 mark**

$$-5(k-3)=2(k+1)$$
$$-5k+15=2k+2$$
$$-5k-2k=-15+2$$
$$-7k=-13$$

$k=\frac{13}{7}$ **1 mark**

4 54. A soccer player takes a shot on goal 20 m away from the goal line. The ball reaches a maximum height of 8 m and lands 4 m behind the goal line. If the top of the net is 3 m high, algebraically determine whether or not the player scored a goal.



Answer:

vertex (12,8) **0.5 marks**

Use another point to determine *a*.

$$\frac{1}{a}(y-k)=(x-h)^2$$

$\frac{1}{a}(y-8)=(x-12)^2$ **0.5 marks**

$$\frac{1}{a}(0-8)=(0-12)^2$$
$$\frac{-8}{a}=144$$

$a=\frac{-8}{144}=\frac{-1}{18}$ **1 mark**

$-18(y-8)=(x-12)^2$ **1 mark**

At $x=20$ m:

$y=-\frac{1}{18}(20-12)^2+8$ **0.5 marks**

$$y=-\frac{1}{18}(8)^2+80$$

$y=4.4$ m No goal! **0.5 marks**

Value

4 55. The power, P, in Watts, supplied to a circuit by a 9 volt battery is given by the formula $P = 9I - 0.5I^2$, where I is the current in amperes. Calculate the approximate instantaneous rate of change in the power with a current of 5 amperes.

Answer:

$P(5.01) = 32.53995$ **1 mark**
$P(5.00) = 32.5$ **1 mark**

$$IRoC = \frac{P(5.01) - P(5)}{5.01 - 5}$$

$$= \frac{32.53995 - 32.5}{0.01}$$ **1 mark**

$$= \frac{0.03995}{0.01}$$

$= 4$ Watts/amp **1 mark**

4 56. Algebraically solve for x: $4^x - 2(2)^x - 3 = 0$.

Answer:

$2^{2x} - 2(2)^x - 3 = 0$ **0.5 marks**

$(2^x - 3)(2^x + 1) = 0$ **1 mark**

$2^x = 3$ $\qquad 2^x = -1$ **1 mark**

~~$2^x = -1$~~ reject **0.5 marks**

$x = \frac{\log 3}{\log 2} = 1.58$ **1 mark**

4 57. Algebraically solve for x: $\log(3-x) = \frac{1}{2}\log 4 - \log x$.

Answer:

$\log(3-x) = \log 4^{\frac{1}{2}} - \log x$ **0.5 marks**

$\log(3-x) = \log\left(\frac{2}{x}\right)$ **1 mark**

$(3-x) = \left(\frac{2}{x}\right)$ **0.5 marks**

$x(3-x) = 2$ **0.5 marks**

$3x - x^2 = 2$

$x^2 - 3x + 2 = 0$ **0.5 marks**

$(x-1)(x-2) = 0$ **0.5 marks**

$x = 1 \quad x = 2$ **0.5 marks**

Value

4 58. The data below shows how the value of a house purchased in 1990 has appreciated in value. If this rate continues, algebraically determine a function to model the situation and use it to determine how many years it will take for the house to reach a value of $142 600.

Year	1990	1995	2000	2005
Value	120000	124800	129792	134984

Answer:

$r = 1.04$ **0.5 marks**

Let t represent the number of years after 1990.

$A = 120000(1.04)^{\frac{t}{5}}$ **1 mark**

$142600 = 120000(1.04)^{\frac{t}{5}}$ **0.5 marks**

$1.18833 = (1.04)^{\frac{t}{5}}$ **0.5 marks**

$\log(1.18833) = \frac{t}{5}\log(1.04)$ **0.5 marks**

$t = \frac{5\log(1.18833)}{\log(1.04)}$

$t = 22$ years **1 mark**

4 59. The population in a community has been declining over a 40 year period as shown in the table below but is not expected to drop below 2500. Determine the equation of the exponential function that describes this population at any given time and use it to determine the population at the end of 2020 if this trend continues.

Year	1960	1970	1980	1990	2000
Time (t)	0	10	20	30	40
Population ($P(t)$)	26500	9760	4696	3164	2701

Answer:

Subtract 2500 from population then determine common ratio. **1 mark**

$P(t) - 2500$	24000	7260	2196	664	201

$r = \frac{7260}{24000} = 0.3025$

Identify H.A.: $y = 2500$ **0.5 marks**

Equation: $P(t) = 24000(0.3025)^{\frac{t}{10}} + 2500$ **1.5 marks**

In 2020, $t = 60$ years.

$P(60) = 2518$ people **1 mark**

Value

3 60. Write the equation $4x^2 + 9y^2 - 8x + 72y + 112 = 0$ in transformational form.

Answer:

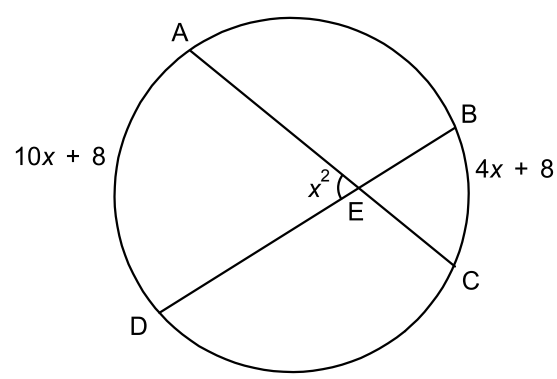
$$4(x^2 - 2x + 1) + 9(y^2 + 8y + 16) = -112 + 4 + 144$$ **1 mark**

$$\frac{4}{36}(x-1)^2 + \frac{9}{36}(y+4)^2 = \frac{36}{36}$$ **1 mark**

$$\frac{1}{9}(x-1)^2 + \frac{1}{4}(y+4)^2 = 1$$ **0.5 marks**

$$\left[\frac{1}{3}(x-1)\right]^2 + \left[\frac{1}{2}(y+4)\right]^2 = 1$$ **0.5 marks**

3 61. In the circle shown, algebraically determine the measure of $\angle\text{AED}$ in degrees.



Answer:

$\angle\text{AED} = \frac{1}{2}\left(m\overset{\frown}{AD} + m\overset{\frown}{BC}\right)$

$x^2 = \frac{1}{2}(10x + 8 + 4x + 8)$ **1 mark**

$x^2 = \frac{1}{2}(14x + 16)$

$x^2 = 7x + 8$ **0.5 marks**

$x^2 - 7x - 8 = 0$

$(x-8)(x+1) = 0$ **0.5 marks**

$x = 8$ or $x = -1$

Check $x = -1$

$10x + 8$

$= 10(-1) + 8$

$= -2$

~~$x = -1$~~ reject

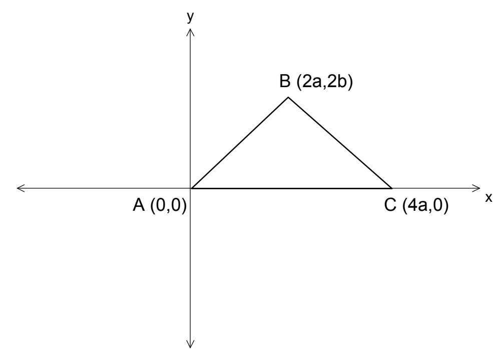
$\angle\text{AED} = x^2$

$\angle\text{AED} = (8)^2 = 64°$ **1 mark**

Value

4 62. Using coordinate geometry, prove that the line segment joining A to the midpoint of BC and the line segment joining C to the midpoint of AB are congruent.

Answer:



Let X be the midpoint of BC.
Let Y be the midpoint of AB.

Point X is $(3a, b)$. **1 mark**

Point Y is (a, b). **1 mark**

$\text{AX} = \sqrt{(3a-0)^2 + (b-0)^2}$

$\text{AX} = \sqrt{(3a)^2 + (b)^2}$

$\text{AX} = \sqrt{9a^2 + b^2}$

$\text{CY} = \sqrt{(4a-a)^2 + (0-b)^2}$

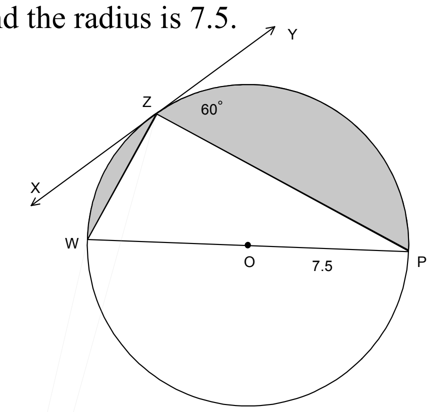
$\text{CY} = \sqrt{(3a)^2 + (-b)^2}$

$\text{CY} = \sqrt{9a^2 + b^2}$ **1.5 marks for both lengths**

Therefore, $\text{AX} \cong \text{CY}$. **0.5 marks**

4 63. In the circle with centre O shown, XY is tangent to the circle at Z. Calculate the total area of the shaded regions if $\angle \text{YZP} = 60°$ and the radius is 7.5.

Answer:



$\text{A}_{\text{shaded}} = \text{A}_{\text{semi-circle}} - \text{A}_{\text{triangle}}$

Area of the semi-circle:

$\text{A}_{\text{semi-circle}} = \frac{1}{2}\pi r^2 = \frac{1}{2}\pi(7.5)^2$ **1 mark**

$\text{A}_{\text{semi-circle}} = 88.4 \text{ units}^2$ **0.5 marks**

$\angle \text{ZWP} = 60°$ (opposite inscribed angle to $\angle \text{YZP}$)
$\angle \text{ZPW} = 30°$ ($\angle \text{WZP} = 90°$, inscribed on diameter)

Use Basic Trig to find side lengths:

WZ = 7.5 units
ZP = 13 units **0.5 marks**

Area of triangle:

$\text{A}_{\text{triangle}} = \frac{1}{2}bh$

$\text{A}_{\text{triangle}} = \frac{1}{2}(7.5)(13)$

$\text{A}_{\text{triangle}} = 48.7 \text{ units}^2$ **1 mark**

$\text{A}_{\text{shaded}} = \text{A}_{\text{semi-circle}} - \text{A}_{\text{triangle}}$

$\text{A}_{\text{shaded}} = 88.4 - 48.7$

$\text{A}_{\text{shaded}} = 39.7 \text{ units}^2$ **1 mark**