



Mathematics 2201 Final Examination

Answer Key

Teacher's Name: _____ Student's Name: _____

Teacher Grading Sheet (PART I)

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

SECTION II

Total Value: 40 Marks

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

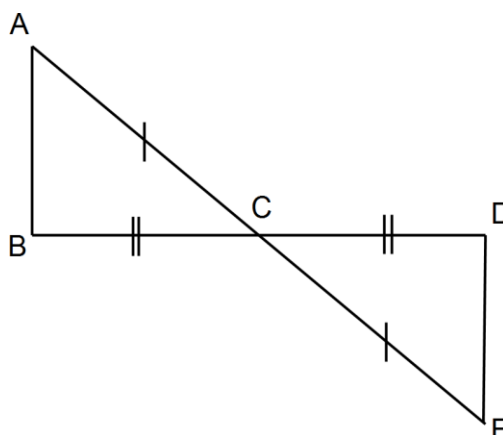
Value

- 3 41. Prove deductively the sum of six consecutive positive numbers is a multiple of three.

$$\begin{aligned} &x + (x + 1) + (x + 2) + (x + 3) + (x + 4) + (x + 5) \\ &= 6x + 15 \\ &= 3(2x + 5) \end{aligned}$$

- 3 42. Given: $\overline{AC} = \overline{EC}$
 $\overline{BC} = \overline{DC}$

Prove: $\triangle ABC \cong \triangle EDC$



Statements	Reason
$\overline{AC} = \overline{EC}$	Given
$\overline{BC} = \overline{DC}$	Given
$\angle ACB = \angle ECD$	Vertically Opposite Angles are \cong
$\triangle ABC \cong \triangle EDC$	SAS

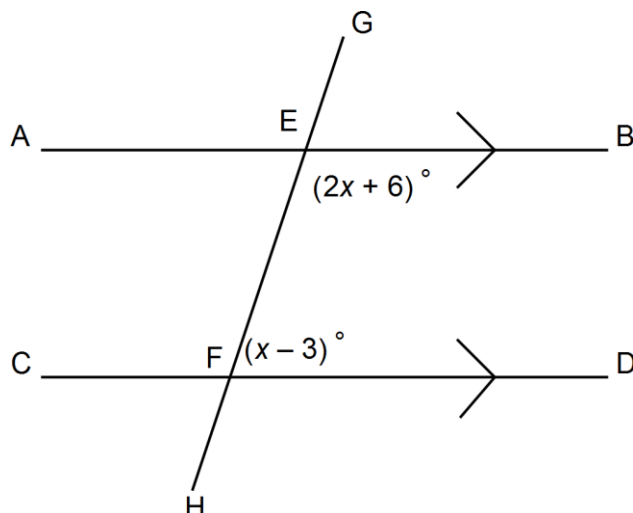
- 2 43. Determine the value of x .

$$2x + 6 + x - 3 = 180^\circ$$

$$3x + 3 = 180^\circ$$

$$3x = 177^\circ$$

$$x = 59^\circ$$



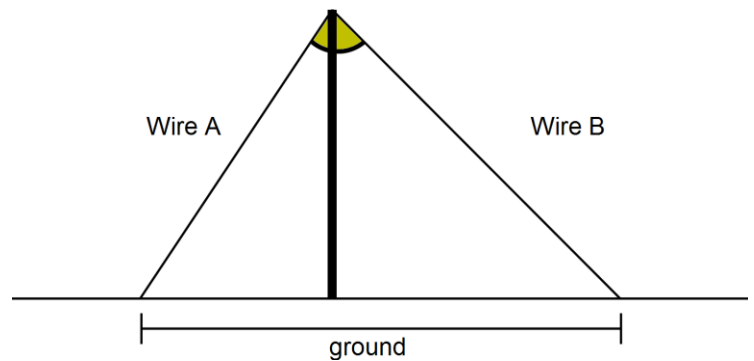
- 2 44. A) A telephone pole is supported by two wires on opposite sides. At the top of the pole, the wires meet to form an angle of 50° . On the ground, the ends of the wires are 20 ft apart. Wire B make a 45° angle with the ground. What is the length of wire A?

$$\frac{\sin 50^\circ}{20} = \frac{\sin 45^\circ}{x}$$

$$x \sin 50^\circ = 20 \sin 45^\circ$$

$$x = \frac{20 \sin 45^\circ}{\sin 50^\circ}$$

$$x = 18.46 \text{ ft}$$

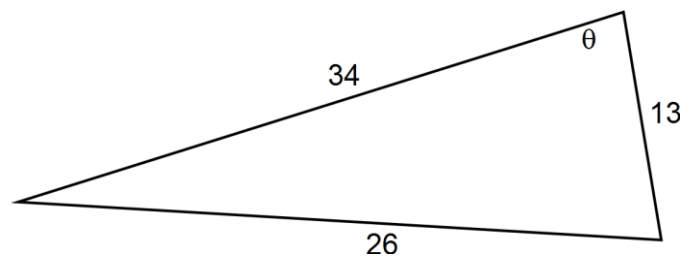


- 2 B) Find the values of angle θ to the nearest degree.

$$\cos A = \frac{b^2 + c^2 - a^2}{2cb}$$

$$\cos \theta = \frac{34^2 + 13^2 - 26^2}{2(34)(13)}$$

$$\theta = 42.8^\circ = 43^\circ$$



- 2 45. Solve: $\sqrt{2x - 1} = 5$

$$\sqrt{2x - 1} = 5$$

$$(\sqrt{2x - 1})^2 = (5)^2$$

$$2x - 1 = 25$$

$$2x - 1 + 1 = 25 + 1$$

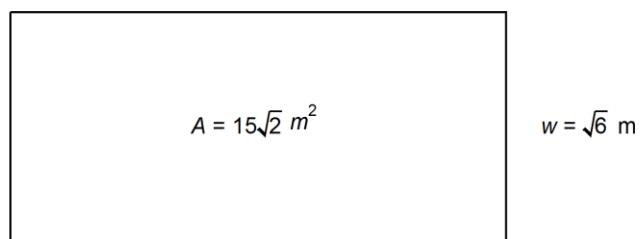
$$2x = 26$$

$$x = 13$$

- 2 46. Simplify: $(\sqrt{3} + \sqrt{2})^2$

$$\begin{aligned}
 & (\sqrt{3} + \sqrt{2})^2 \\
 & (\sqrt{3} + \sqrt{2})(\sqrt{3} + \sqrt{2}) \\
 & 3 + \sqrt{3}\sqrt{2} + \sqrt{3} + \sqrt{2} + 2 \\
 & 3 + 2\sqrt{3}\sqrt{2} + 2 \\
 & 5 + 2\sqrt{6}
 \end{aligned}$$

- 3 47. A dog kennel has an area of $15\sqrt{2} \text{ m}^2$, and a width of $\sqrt{6} \text{ m}$. Determine the perimeter of the dog kennel in simplest form, using exact values.



$$L = \frac{A}{W}$$

$$L = \frac{15\sqrt{2}}{\sqrt{6}} \times \frac{\sqrt{6}}{\sqrt{6}}$$

$$L = \frac{15\sqrt{12}}{6}$$

$$L = \frac{5\sqrt{12}}{2}$$

$$L = \frac{10\sqrt{3}}{2}$$

$$L = 5\sqrt{3}$$

$$P = 2L + 2W$$

$$P = 2(5\sqrt{3}) + 2(\sqrt{6})$$

$$P = 10\sqrt{3} + 2\sqrt{6}$$

48. The mean life of Brand A batteries is 160 hours with a standard deviation of 20 hours.

2 A) Determine the z-score of a battery that lasted 170 hours.

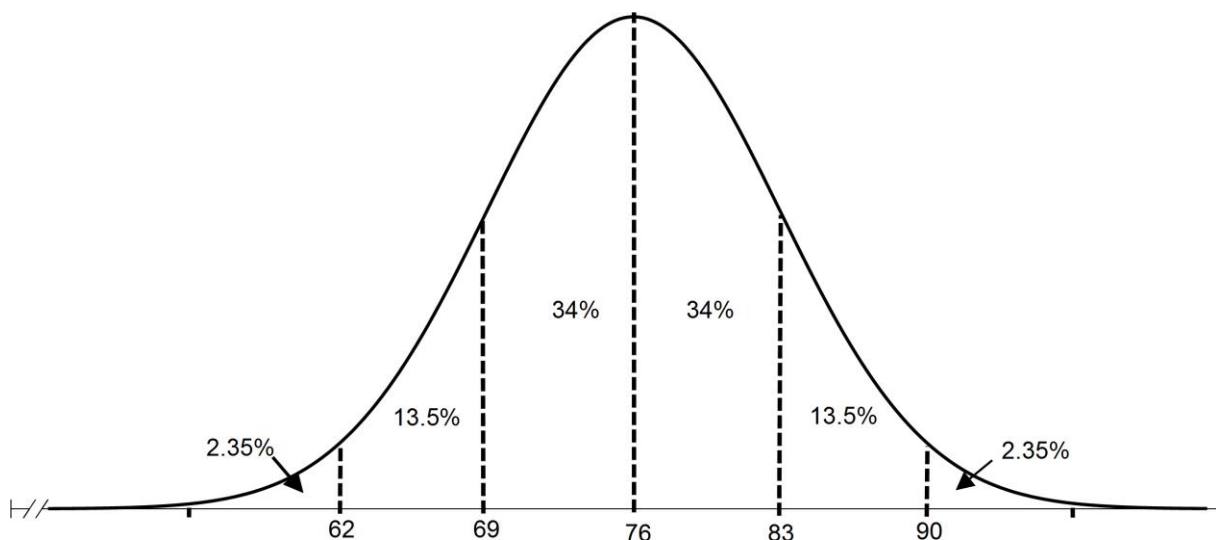
$$z = \frac{170 - 160}{20} = +0.50$$

1 B) Using z-scores, what percent of the batteries will last less than 170 hours?

69.15% of the batteries will last up to 170 hours.

49. The results of a math unit test are normally distributed with a mean score of 76 and a standard deviation of 7.

1 A) Draw and label the normal curve to represent this data.



1 B) What percent of the student scored between 62 and 83?

$$13.5\% + 34\% + 34\% = 81.5\%$$

3 50. Bob kicked a beach ball into the air. After 3 seconds, the ball reached a maximum height of 5 m. If the ball was in the air for 6 seconds before it landed, determine the quadratic function that describes the path of the beach ball.

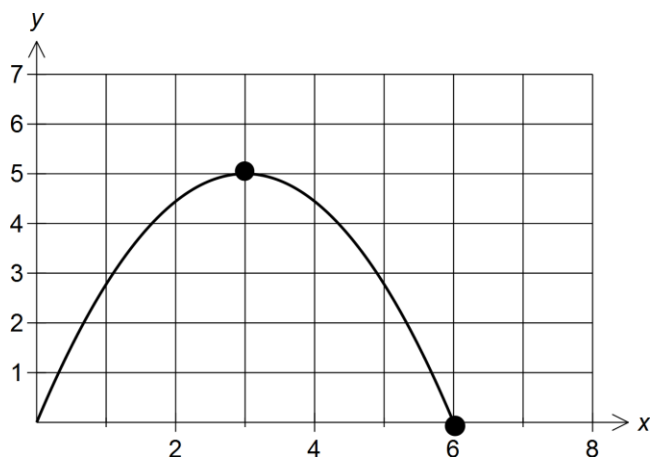
$$(h, k) = (3, 5)$$

$$y = a(x - h)^2 + k$$

$$0 = a(6 - 3)^2 + 5$$

$$-\frac{5}{9} = a$$

$$y = -\frac{5}{9}(x - 3)^2 + 5$$



- 3 51. What is the vertex of $y = 3(x - 2)(x + 10)$?

Roots:

x -coordinate

$$\begin{aligned} x - 2 &= 0 \\ x &= 2 \end{aligned}$$

$$\frac{2 + (-10)}{2} = -\frac{8}{2} = -4$$

$$\begin{aligned} x + 10 &= 0 \\ x &= -10 \end{aligned}$$

y -coordinate

$$\begin{aligned} y &= 3(-4 - 2)(-4 + 10) \\ y &= 3(-6)(6) \\ y &= -108 \end{aligned}$$

Therefore the vertex is $(-4, -108)$

- 3 52. The sum of the squares of two positive consecutive integers is 113. What are the two integers?

$$x^2 + (x + 1)^2 = 113$$

$$x^2 + (x^2 + 2x + 1) = 113$$

$$2x^2 + 2x - 112 = 0$$

$$2(x^2 + x - 56) = 0$$

$$2(x + 8)(x - 7) = 0$$

$$\begin{aligned} x + 8 &= 0 \\ x &= -8 \text{ (Reject)} \end{aligned}$$

$$\begin{aligned} x - 7 &= 0 \\ x &= 7 \end{aligned}$$

If $x = 7$ then $x + 1 = 8$

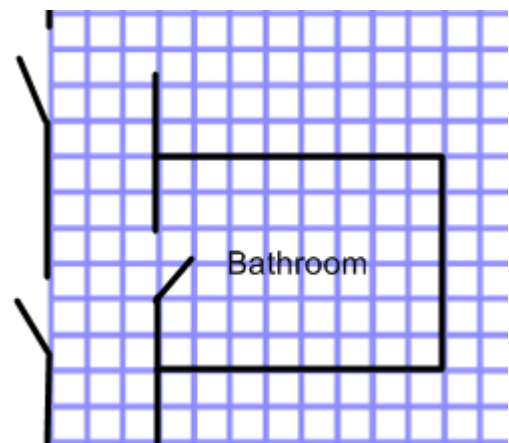
Therefore the two consecutive integers are 7 and 8.

- 3 53. Find the zeros of $y = 9x^2 - 6x - 1$.

$$\begin{aligned}x &= \frac{-b \pm \sqrt{b^2 - 4ac}}{2a} \\x &= \frac{-(-6) \pm \sqrt{(-6)^2 - 4(9)(-1)}}{2(9)} \\x &= \frac{6 \pm \sqrt{36 + 36}}{18} \\x &= \frac{6 \pm \sqrt{72}}{18} \\x &= \frac{6 \pm 6\sqrt{2}}{18} \\x &= \frac{1 \pm \sqrt{2}}{3}\end{aligned}$$

Teachers may accept decimal approximate equivalents

- 2 54. The floor plan has a scale of 1 unit = 12 inches. The owner intends to use 6 inch by 6 inch square tiles to cover the floor of the bathroom. Tiles cost \$0.99 each. What is the total cost of the tiles?



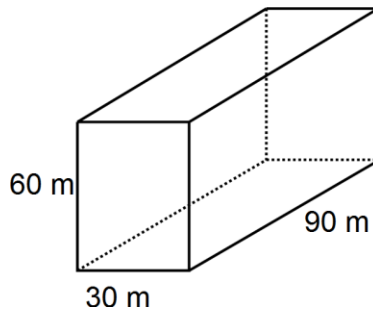
$$\text{length} = 8 \times 2 = 16$$

$$\text{width} = 6 \times 2 = 12$$

$$16 \times 12 = 192 \text{ tiles}$$

$$192 \text{ tiles} \times \$0.99 = \$190.08$$

- 2 55. An underground storage tank is used to collect storm water.



A new tank is needed with a volume of 8 times the present tank. Determine the dimensions of the new tank if every side is enlarged by the same factor.

$$\begin{aligned} \text{volume of original tank} &= 60 \text{ m} \times 30 \text{ m} \times 90 \text{ m} \\ \text{volume of original tank} &= 162\,000 \text{ m}^3 \end{aligned}$$

$$\begin{aligned} \text{volume of new tank} &= 8 \times 162\,000 \text{ m}^3 \\ \text{volume of original tank} &= 1\,296\,000 \text{ m}^3 \end{aligned}$$

$$k^3 = \frac{\text{volume of similar object}}{\text{volume of original object}} = \frac{1\,296\,000 \text{ m}^3}{162\,000 \text{ m}^3} = 8$$

Therefore the scale factor (k) is 2

New Dimensions: 60m \times 120m \times 180m