Mathematics 9 Year End Review Booklet

NUMBER: PLO A3 Demonstrate an understanding of rational numbers.

A

1. You add a rational number to its double, use x and $2x$. The result is $9/5$. Show algebraically what the rational number is?
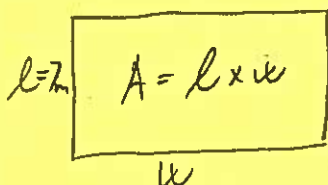
   $x + 2x = \frac{9}{5}$ $x = \frac{9}{15}$

   $3x = \frac{9}{5}$

   $15x = 9$ $\boxed{x = \frac{3}{5}}$

   (a.) 3 / 5
   b. 9 / 10

   c. −5 / 9
   d. −2 / 3

B

2. A rectangular park of length 7 metres has 21 more square metres in its area than it has metres in its perimeter. Draw a diagram and determine algebraically what its width is?

   $l = 7$ $\boxed{A = l \times w}$

   w

   $A = 21 + P$
   $P = 2(l + w)$
   $A = l \times w$
   $l = 7\,m$

   $21 + 2(l + w) = l \times w$
   $21 + 2(7 + w) = 7w$
   $21 + 14 + 2w = 7w$
   $35 = 5w$
   $\boxed{w = 7\,m}$

   a. 14 m
   (b.) 7 m

   c. −1.4 m
   d. 5 m

Short Answer

3. What value describes the position of point A?

   $\boxed{A: \; -2.2}$

   −2.2   −1.8
   A

   −3.2   −2.4   −2.0   −1.6   −0.8   0
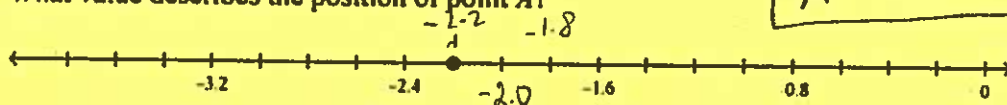
4. What value describes the position of point C?

   $\boxed{C: \; -2.75}$

   C

   −3   −2   −1   0   1
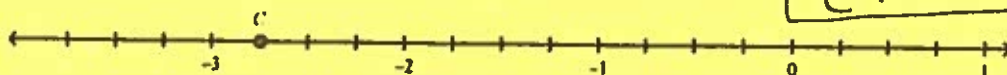
5. Write $-9\frac{2}{3}$ as the quotient of two integers.

   $-\dfrac{29}{3} = -29 \div 3$

6. Write $-\frac{19}{4}$ as a decimal.

   $-\dfrac{19}{4} = -4\frac{3}{4} = \boxed{-4.75}$

7. Write $4\frac{3}{8}$ as a decimal.

   $4\frac{3}{8} = \boxed{4.375}$

$\frac{1}{8} = 0.125 \Rightarrow \frac{3}{8} = 0.375$
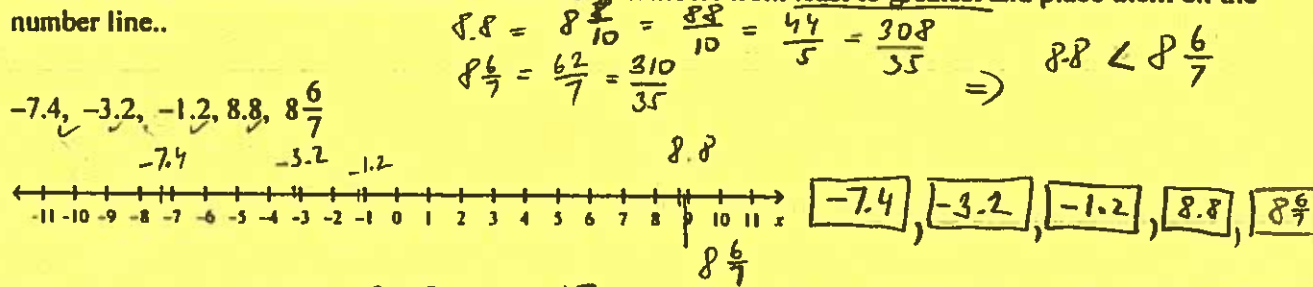
1

8. Without the use of a calculator order the following numbers from least to greatest.

$-13.2, -15\frac{1}{2}, 2\frac{1}{3}, -13\frac{1}{10}$
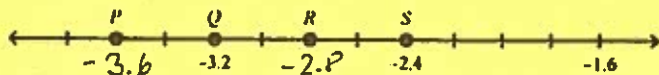
$-13.2, -15.5, 2.\overline{3}, -13.1$

$\boxed{-15\frac{1}{2}}, \boxed{-13.2}, \boxed{-13\frac{1}{10}}, \boxed{2\frac{1}{3}}$

9. Without the use of a calculator order the following numbers from least to greatest and place them on the number line..

$8.8 = 8\frac{8}{10} = \frac{88}{10} = \frac{44}{5} = \frac{308}{35}$

$8\frac{6}{7} = \frac{62}{7} = \frac{310}{35}$

$\Rightarrow 8.8 < 8\frac{6}{7}$

$-7.4, -3.2, -1.2, 8.8, 8\frac{6}{7}$

$\boxed{-7.4}, \boxed{-3.2}, \boxed{-1.2}, \boxed{8.8}, \boxed{8\frac{6}{7}}$

10. List three rationals between $3\frac{3}{4}, 4\frac{3}{4}$ $\Rightarrow \frac{15}{4}$ and $\frac{19}{4}$ $\boxed{\frac{161}{40}}; \boxed{\frac{17}{4}}, \frac{18}{4} = \boxed{\frac{9}{2}} = 4.$

11. Describe how P compares to Q.

$P \text{ is } 0.4 \text{ less than } Q$

12. Evaluate $-2.6 + (-2.8)$.

$= -2.6 - 2.8$

$= \boxed{-5.4}$

13. Evaluate $3\frac{1}{5} + (-\frac{4}{7})$.

$= \frac{16}{5} - \frac{4}{7}$

$= \frac{112}{35} - \frac{20}{35}$

$= \frac{92}{35}$

$= \boxed{2\frac{22}{35}}$

19. The sum of three numbers is 2. One number is (−3) times another. The quotient of another pair of the numbers is 4. What are the numbers?

$$x + y + z = 2$$

$$x = -3y$$

$$\frac{y}{z} = 4 \quad\longrightarrow\quad z = \frac{y}{4}$$

$$x + y + z = 2$$

$$-3y + y + \frac{y}{4} = 2$$

$$-12y + 4y + y = 8$$

$$-7y = 8$$

$$\boxed{y = -\frac{8}{7}}$$

$$\boxed{x = \frac{+24}{7}}$$

$$z = \frac{-8}{7} \div 4$$

$$z = \frac{-8}{28} = \boxed{\frac{-2}{7}}$$

PLO A1 Demonstrate an understanding of powers.

20. Write the following as a cubic $-6 \times -6 \times -6 = \boxed{(-6)^3}$? $\quad (-6)^3$

Write the following as a square $-0.2 \times -0.2 = \boxed{}^2$? $\quad ()^2$

Evaluate each of the following: $(-2)^2, (-2^4), -2^4$

$$\underline{(-2)^2 = 4 \; ; \; (-2^4) = (-1)(2^4) = -16, \; -16}$$

21. What is 5^3? $\boxed{125}$

22. Represent $3 \times 3 \times 3 \times 3 \times 3$ as a power. 3^5

23. Represent $(-3.7)(-3.7)(-3.7)$ as a power. $(-3.7)^3$

24. Represent $\left(\frac{3}{5}\right)\left(\frac{3}{5}\right)\left(\frac{3}{5}\right)\left(\frac{3}{5}\right)$ as a power. $\left(\frac{3}{5}\right)^4$

25. Represent 6^3 using repeated multiplication. $6^3 = 6 \times 6 \times 6$

26. Represent $(-6)^3$ using repeated multiplication. $(-6)^3 = (-6)(-6)(-6)$

27. Represent -6^3 using repeated multiplication. $-6^3 = (-1)(6)(6)(6)$

28. Represent $-(-6)^3$ using repeated multiplication. $(-1)(-6)(-6)(-6)$

29. Evaluate -4^4. $\boxed{-256}$

30. Arrange in order from least to greatest: $-7^2, (-1)^{105}, (-3)^3, (-1)^8, -(-6^4)$.

$$\boxed{-7^2}, \boxed{(-3)^3}, \boxed{(-1)^{105}}, \boxed{(-1)^8}, \boxed{-(-6^4)}$$

$$-7^2 = -49 \qquad (-3)^3 = -27$$

$$(-1)^{105} = -1 \qquad (-1)^8 = 1$$

$$-(-6^4) = 1296$$

4

Name: _____

14. Evaluate $-3\frac{4}{5}-\left(-3\frac{4}{5}\right) = \dfrac{-19}{5} + \dfrac{19}{5} = \boxed{0}$

15. Calculate $\frac{2}{3}+\left(\frac{-3}{4}+\frac{1}{5}\right) = \frac{2}{3} + \left(\dfrac{-15}{20} + \dfrac{4}{20}\right)$ → $\boxed{\dfrac{7}{60}}$

$= \dfrac{2}{3} - \dfrac{11}{20}$

$= \dfrac{40}{60} - \dfrac{33}{60}$

16. Evaluate $\frac{2}{5}\left(\frac{1}{8}+\frac{-1}{5}\right) = \frac{2}{5}\left(\dfrac{5}{40} - \dfrac{8}{40}\right)$

$= \dfrac{2}{5}^{1} \times \dfrac{-3}{\cancel{40}\,20} = \boxed{\dfrac{-3}{100}}$

17. Evaluate $-2\frac{2}{3}x+(-y)$ when $x = 1\frac{1}{4}$ and $y = -1\frac{3}{4}$

$= \left(\dfrac{-\cancel{8}}{3}\right)\left(\dfrac{5}{\cancel{4}\,1}\right) + \left(-\left(-\dfrac{7}{4}\right)\right)$

$= \dfrac{-10}{3} + \dfrac{7}{4} = \dfrac{-40}{12} + \dfrac{21}{12} = \boxed{\dfrac{-19}{12}}$

18. Evaluate $\left(\dfrac{-21}{64}\right)\left(\dfrac{8}{7}\right)^{1} = \boxed{\dfrac{-3}{8}}$ $\dfrac{3}{4} \div \dfrac{21}{20}$ $\dfrac{\frac{5}{3}}{\frac{100}{12}} = \dfrac{\cancel{5}^{1}}{\cancel{3}_{1}} \times \dfrac{\cancel{12}^{4}}{\cancel{100}\,20}$

$= \dfrac{\cancel{3}^{1}}{\cancel{4}_{1}} \times \dfrac{\cancel{20}^{5}}{21\,7}$ $= \dfrac{4}{20} = \boxed{\dfrac{1}{5}}$

$= \boxed{\dfrac{5}{7}}$

Subtract a rational number from its triple. The result is $\frac{3}{8}$. What is the rational number?

$3x - x = \dfrac{3}{8}$ $\boxed{x = \dfrac{3}{16}}$

$2x = \dfrac{3}{8}$

$16x = 3$

31. **PLO A2 Demonstrate an understanding of operations on powers.**

Express $(2^3)^3(2^9)$ as a power with a single exponent. $2^9 \cdot 2^9 = \boxed{2^{18}}$

32. Express $\dfrac{5^9}{5^7}$ as a power with a single exponent. $5^{9-7} = \boxed{5^2}$

33. Express $(7^2)^6 \div 7^4$ as a power with a single exponent. $7^{12} \div 7^4 = \boxed{7^8}$

34. Evaluate $\dfrac{(4^6)^3}{(4^2)^4(4^2)}$. $= \dfrac{4^{18}}{4^8 \cdot 4^2} = \dfrac{4^{18}}{4^{10}} = \boxed{4^8}$

35. Express $\dfrac{(n^3)^5(n^2)}{(n^4)(n^6)}$ as a power with a single exponent. $\dfrac{n^{15} \, n^2}{n^{4+6}} = \dfrac{n^{17}}{h^{10}} = \boxed{h^7}$

36. Express $\left(\dfrac{3^3}{2^4}\right)^2$ as a quotient of two powers. $\boxed{\dfrac{3^6}{2^8}}$

37. Write $(2 \times 5)^3$ as a power with a single base. $\boxed{10^3}$

38. Simplify $(7^2 \times 6^3)^3$. $\boxed{7^6 \times 6^9}$

39. Simplify $(2^3 \times 3^3)^2(3^3 \times 2^2)^2$. $(2^6 \times 3^6)(3^6 \times 2^4) = \boxed{2^{10} \times 3^{12}}$

40. Simplify $\left(\dfrac{4^4}{2^4}\right)^3$. $\dfrac{4^{12}}{2^{12}} = \dfrac{(2^2)^{12}}{2^{12}} = \dfrac{2^{24}}{2^{12}} = \boxed{2^{12}}$

41. **PLO A4 Order of Operations**

Evaluate $7^2 - 3^3$. $49 - 27 = \boxed{22}$

42. Evaluate $3^3 - 4 + 2 + 7 - 5$. $= 27 - 2 + 7 - 5$
$= \boxed{27}$

43. Calculate $\sqrt{\dfrac{27}{3}}$. ✗

$\ast \quad \sqrt{\dfrac{27}{3}} = \sqrt{9} = \boxed{\pm 3}$

44. Evaluate $6^3 + \sqrt{9} \times 3^2 - 4$.

$= 216 + 3 \times 9 - 4$

$= 216 + 27 - 4$

$= \boxed{239}$

$\begin{array}{r} 24 \\ \times\ 24 \\ \hline 96 \\ +480 \\ \hline 576 \end{array}$

45. Evaluate without a calculator $\left(\sqrt{64} + \sqrt{256}\right)^3 \div 24 + 2$. Please show your work.

$= \left(8 + 16\right)^3 \div 24 + 2$

$= 24^3 \div 24 + 2$

$= 24^{3-1} + 2$

$= 24^2 + 2$

$= 576 + 2$

$= \boxed{578}$

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46. **PLO A5 Square Roots of rational numbers that are perfect squares.**

Determine $\sqrt{12100}$ $= \sqrt{121 \times 100}$ $= \sqrt{121} \times \sqrt{100}$ $= 11 \times 10$

$= \pm \boxed{110}$

Determine $\sqrt{2.25}$ to two decimal places.

$\sqrt{2.25} = \sqrt{\dfrac{225}{100}} = \dfrac{\sqrt{225}}{\sqrt{100}} = \dfrac{15}{10} = \boxed{\dfrac{3}{2} = 1.50}$

Determine $\sqrt{\dfrac{196}{49}}$ with the answer left as an exact value.

$\dfrac{\sqrt{196}}{\sqrt{49}} = \dfrac{14}{7} = \boxed{2}$

$\begin{array}{r} *\ 3.8 \\ \times\ 3.8 \\ \hline 304 \\ 1140 \\ \hline 14.44 \end{array}$

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47. **PLO A6 Square Roots of rational numbers that are not perfect squares.**
List the two closest whole numbers between which $\sqrt{18.9}$ lies.

$\sqrt{16} \quad \sqrt{18.9} \quad \sqrt{25}$

$\dfrac{}{4} \quad \dfrac{}{} \quad \dfrac{}{} \longrightarrow$
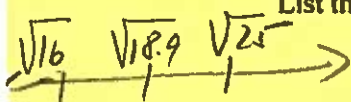
4 and 5

$\begin{array}{r} \times\times \\ 3.9 \\ \times\ 3.9 \\ \hline 351 \\ 1170 \\ \hline 15.21 \end{array}$

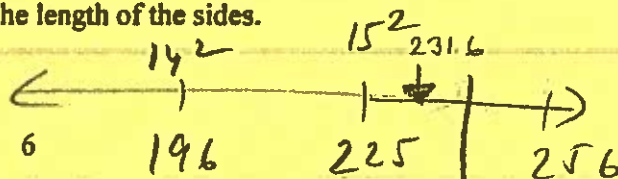48. Without a calculator find the square root of 15 to the nearest tenth..

$\sqrt{15} = ?$

$\dfrac{21}{\sqrt{9}} \quad \dfrac{}{\sqrt{16}}$

guess 3.8 check * try 3.9 x+

15.21 is closer to 15 than 14.44 $\Rightarrow \sqrt{15} \doteq \underline{3.9}$

49. The area of a square is 231.6 units². Estimate the length of the sides.

$A = s^2$

$S = \sqrt{A}$

$S = \sqrt{231.6}$

$\boxed{S \doteq 15.2 \text{ units}}$

$14^2 \qquad 15^2 \ 231.6$

$\longleftarrow \quad |\ \ \ \ |\ *\ | \longrightarrow$

$6 \qquad 196 \qquad 225 \quad 256$

$240.5 \rightarrow$ wide
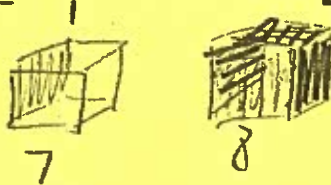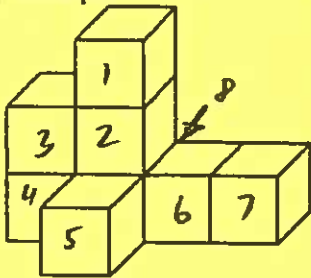
overlap
is shaded

1   3   2   2   1   2

1   2   3   4   5   6
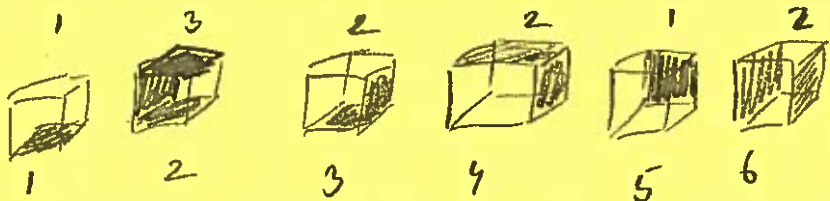
50. **MEASUREMENT: PLO C2 Surface area of composite 3-D objects**
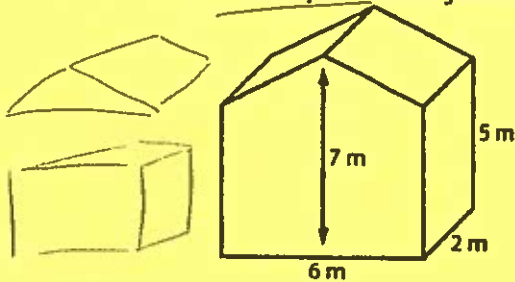Each cube is 1.0 cm long. Decompose the structure into the fewest possible parts, and calculate the area of overlap.

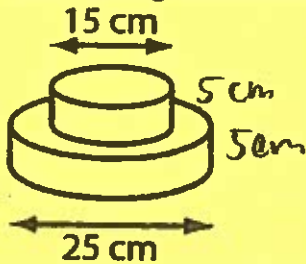1   4

7   8

$$A = 16\ cm^2$$

$$1 + 3 + 2 + 2 + 1 + 2 + 1 + 4 = 16$$

51. Decompose this object and calculate the area of overlap.

5 m
7 m
2 m
6 m

$$overlap: 2 \times \boxed{} \begin{array}{c} 2m \\ 6\ m \end{array} = \boxed{24\ m^2}$$

52. These disks will be glued together to make a display stand, each level is 5 cm high. What is the surface area that will be glued and what is the surface area that will be painted?
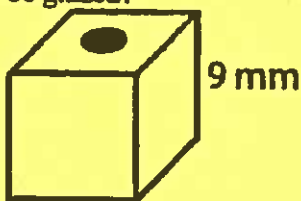
15 cm
5 cm
5 cm
25 cm

$$SA_g = 2 \cdot \pi r^2 \quad ; \quad r = 7.5$$
$$\doteq 353.43\ cm^2$$

$$SA_p = \pi(7.5)^2 + 2\pi(7.5)(5) + 2\pi(12.5)^2 + 2\pi(12.5)(5)$$
$$- \pi(7.5)^2 = 1610.07\ cm^2$$

53. Nooshin made beads for her bracelet by poking 3 mm holes through 15 small clay cubes. She plans to decorate the beads with glaze. To the nearest millimetre, what is the total surface area of the beads that will be glazed?

9 mm

$$1\ bead: SA = 6(9^2) + 2\pi(1.5)(9)$$
$$- 2\pi(1.5)^2$$

$$r = 1.5\ mm$$

$$SA \doteq 556.69\ mm^2$$

$$SA_{glazed} = (15)(556.69) = 8350.29\ mm^2$$

54. **PATTERNS & RELATIONS:** PLO B1 Generalize a pattern arising from a problem-solvi
    context using linear equations.
    PLO B2 Graph linear relations, analyse the graph, and interpolate or extrapolate to solve
    problems.

Matthew can ride at 12 km/h for a bike marathon.
a) Graph the relation.

b) Determine how far he can ride in 5 hours.   He will ride 60km in 5 hours.

c) Determine how long Matthew will take to ride 108 km.   About 9 hours.

distance in km

time in hours
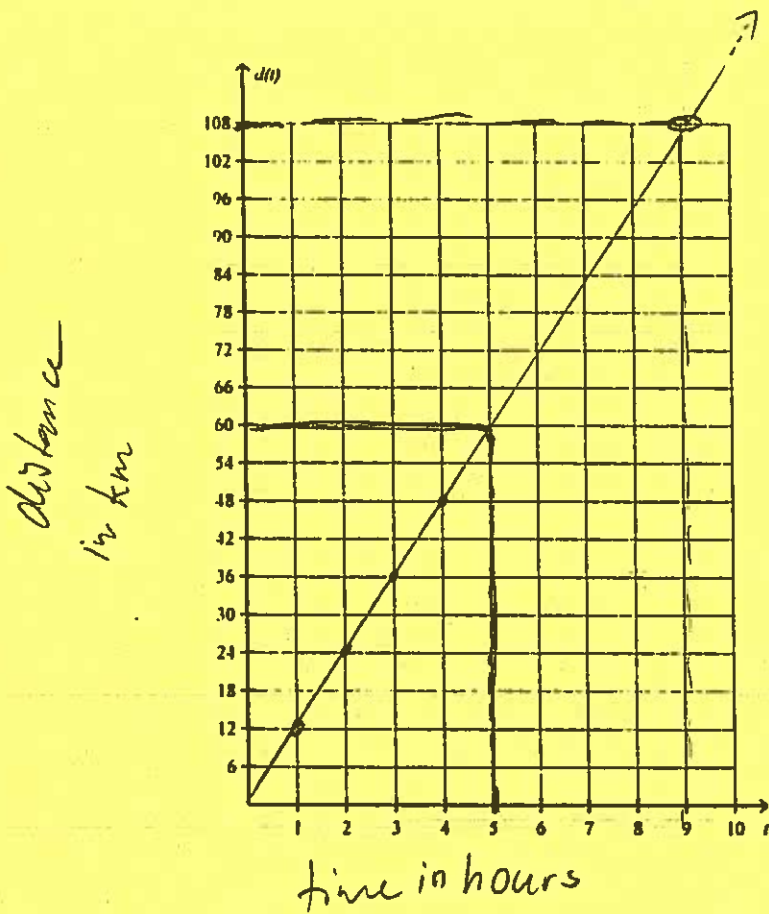
55. Jesse pays a one-time fee of \$3 to download songs plus \$0.50 for each song. An equation for this is $C = 0.5s + 3$, where C is the cost to download s songs. Complete the table. Show your substitution for each value you record.

ex. $C = 0.5s + 3$
$\quad C = 0.5(0) + 3$
$\quad C = 3$

$C = 0.5(1) + 3$
$\quad = 3.5$

$C = 0.5(2) + 3$
$\quad = 4$

$C = 0.5(3) + 3$
$\quad = 4.5$

$C = 0.5(4) + 3$
$\quad = 5$

s	1	2	3	4
C	3.5	4	4.5	5

56. Determine the rate of change for the relation in the table and <u>write an equation to represent</u> the relation.

x	1	2	3	4
y	5	8	11	14

rate of change : $+3$

$$\boxed{y = 3x + 2}$$

57. As part of their training for a 5 km race this summer, Sophie and Taylor run before school starts, when most of us are still asleep. The graph below shows their times and distances. Place a point at $(0,0)$. Write a linear equation that represents this scenario. Determine (algebraically) how long they take to run 4 km.
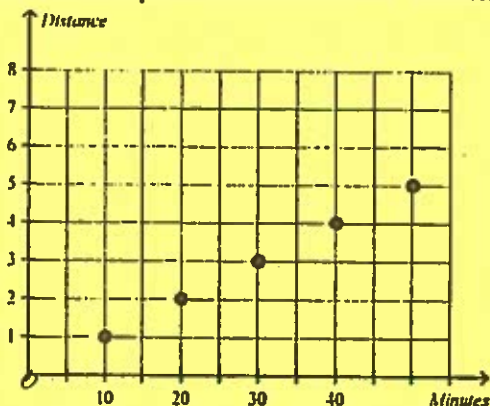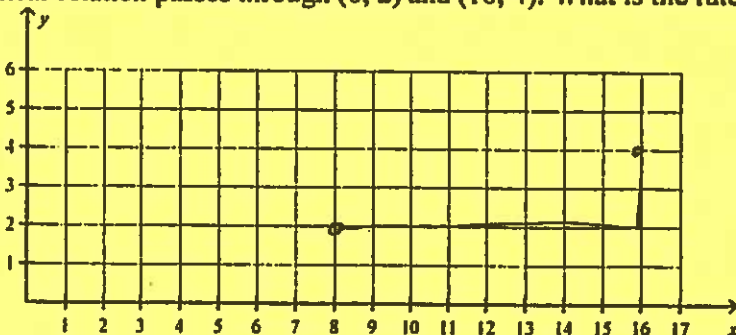

$d = 0.1m$

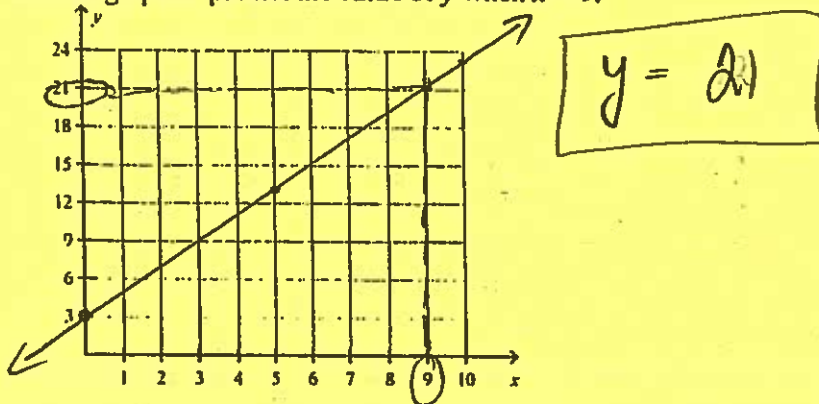$4 = 0.1m$

$\dfrac{4}{0.1} = m$

$$\boxed{m = 40 \text{ min}}$$

58. A linear relation passes through $(8, 2)$ and $(16, 4)$. What is the rate of change?
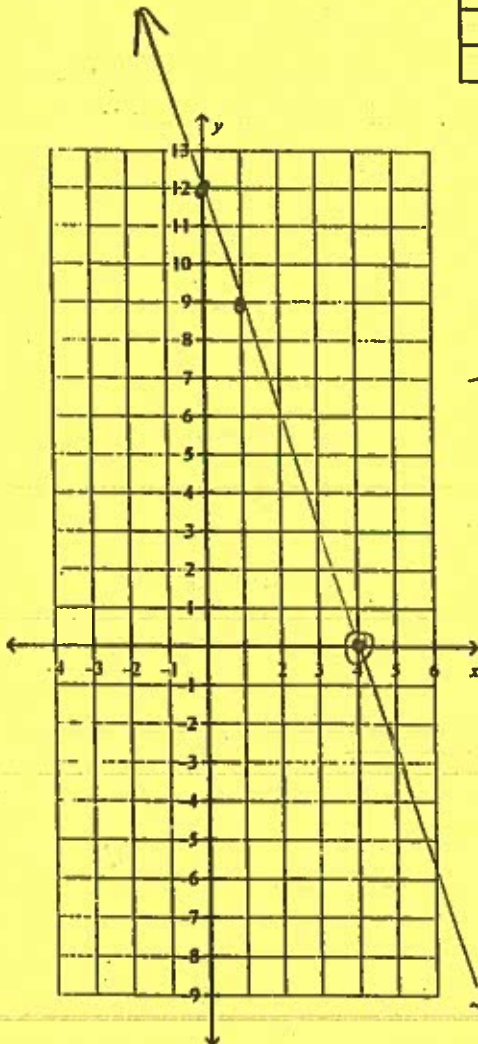

rate of change:
up two over eight

$$\dfrac{+2}{8} = \boxed{\dfrac{1}{4}}$$

9

59. Graph $y = 2x + 3$ using the points $(0, 3)$, $(5, 13)$, and $(10, 23)$.
    Use the graph to predict the value of y when $x = 9$.

$$y = 21$$

Graph $y + 3x = 12$. Fill in the table of values below. Choose an x value to use as a checking point. Graph and predict the value of y when $x = 4$. Show using substitution that the point is a solution for this linear equation.

x	y
0	12
4	0
1	9

$x = 4 \Rightarrow y = 0$

Substitute $x = 4$

$y + 3(4) = 12$

$y + 12 = 12 \qquad \vert -12$

$$y = 0$$

60. Graph the table of values and determine if the relation between x and y is linear.

x	-2	-1	0	1	2
y	4	1	0	1	4
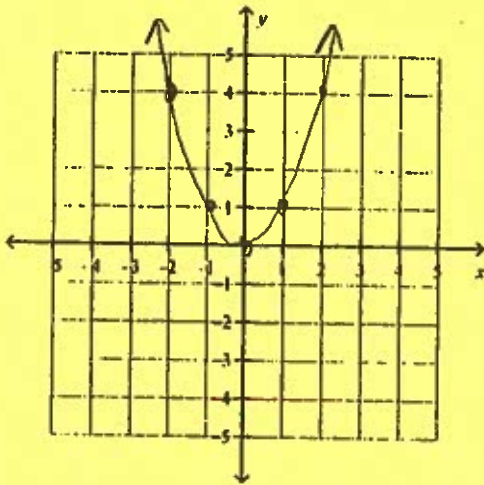
Not linear.

61. **PLO B3 Model and solve problems using linear equations.**
Estimate a solution to the equation $4(x + 2) = 11$.

$x \doteq \underline{0.8}$

62. Estimate a solution to the equation $17 - 5x = 3$.

$x \doteq \underline{2.8}$

63. Estimate a solution to the equation $-4x + 12 = 19$.

$x \doteq \underline{-1.8}$

64. List the operations you would use to isolate the variable in the equation $\frac{18}{x} - 1 = 2$.

→ add 1

→ multiply by x

→ divide by 3

_____

65. Solve the equation $4(3x - 1) = 44$.

$12x - 4 = 44$

$\frac{12x}{12} = \frac{48}{12}$

$\boxed{x = 4}$

66. The relation between Celsius and Fahrenheit is $C = \frac{5}{9}(F - 32)$.

a) Determine what Celsius temperature is equivalent to 68°F. *Hint: substitute 68 for F in the equation and show your work without a calculator.*

$$C = \frac{5}{9}(68 - 32)$$

$$C = \frac{5}{9_1} \times \frac{36^4}{1}$$

$$\underline{\underline{C = 20°C}} = 68°F$$

b) Determine what Fahrenheit temperature is equivalent to 28°C. *Hint: substitute 28 for C in the equation then multiply both the LHS (left hand side) and the RHS by $\frac{9}{5}$*

$$28 = \frac{5}{9}(F - 32) \quad |\cdot 9$$

$$252 = 5(F - 32) \quad |\div 5$$

$$50.4 = F - 32 \quad |+32$$

$$\therefore 28°C = \underline{\underline{82.4°F}}$$

c) Apply the formula to convert Snag, Yukon's record low of −63 °C to degrees Fahrenheit, to the nearest degree.

$$-63 = \frac{5}{9}(F - 32) \quad |\times \frac{9}{5}$$

$$-113.4 = F - 32 \quad |+32$$

$$\underline{\underline{F = -81.4}}$$

$$\therefore T = -63°C = \underline{\underline{-81.4°}}$$

67. Solve the equation $\frac{x}{3} - \frac{x}{4} = 6$.

$$\frac{4x}{12} - \frac{3x}{12} = \frac{6}{1} \quad |\cdot 12$$

$$x = (6)(12)$$

$$\boxed{x = 72}$$

12

68. A number, x, after being doubled and decreased by 1, is equal to 3 times the number plus another 4. Please use algebra in order to determine the number.

$$2x - 1 = 3x + 4$$
$$2x - 3x = 4 + 1$$
$$-x = 5$$
$$\boxed{x = -5}$$

Check:
LS : $(-5)(2) - 1$
$= -11$

RS : $(3)(-5) + 4$
$= -11$

LS = RS ✓

69. A number, x, after being divided by 4, is equal to 5. Please use algebra in order to determine the number.

$$\frac{x}{4} = 5$$

$$\boxed{x = 20}$$

70. Solve, algebraically, the following equation for x. $\frac{(x-2)}{7} + 6 = \frac{1}{2}$

$$\frac{(x-2)}{7} + \frac{6}{1} = \frac{1}{2} \qquad 1.14 \qquad \boxed{x = -36.5}$$

$$2(x-2) + 84 = 7$$
$$2x - 4 = 7 - 84$$
$$2x = -73$$

71. Solve the equation $\frac{(2x)}{3} + \frac{x}{4} = 11$.

$$\frac{4(2x)}{12} + \frac{3x}{12} = \frac{11}{1} \qquad 1.12$$

$$8x + 3x = 132 \qquad \boxed{x = 12}$$
$$\frac{11x}{11} = \frac{132}{11}$$

13

72. Solve the equation $2x - 3 - 5x = \frac{1}{4}(15 + x)$. Please leave the answer in <u>fraction form.</u>

$2x - 3 - 5x = \frac{1}{4}(15 + x)$

$-3x - 3 = \frac{1}{4}(15 + x)$ $|\times 4$

$-12x - 12 = 15 + x$

$-13x = 15 + 12$

$-13x = 27$

$x = -\frac{27}{13}$

$x = -2\frac{1}{13}$

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73. **PLO B4 Solving single variable linear inequalities ($< or \leq or > or \geq$).**
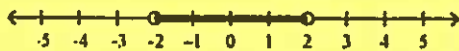Write an inequality that represents the statement: The T-shirts cost more than or equal to 5 dollars.

$\underline{T \geq 5.00}$

74. Write an inequality that represents the statement: A number is less than or equal to 13.

$\underline{x \leq 13}$

75. Write the inequality represented by the number line.

$\boxed{-2 < x < 2}$

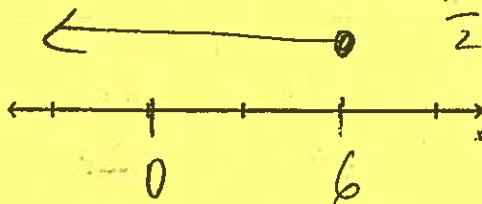76. Write the inequality represented by the number line.
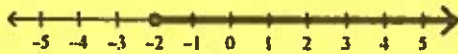
$\boxed{x \geq -2}$

77. Solve and graph the inequality $3(x + 4) \geq 5x$, where x is a rational number.

$3x + 12 \geq 5x$

$12 \geq 5x - 3x$

$\frac{12}{2} \geq \frac{2x}{2}$

$\boxed{\begin{array}{l} 6 \geq x \\ \text{or} \\ x \leq 6 \end{array}}$

0   6

78. **PLO B5 Demonstrate an understanding of polynomials.**
    PLO B6 Model, record, and explain the operations of addition and subtraction of polynomial expressions.
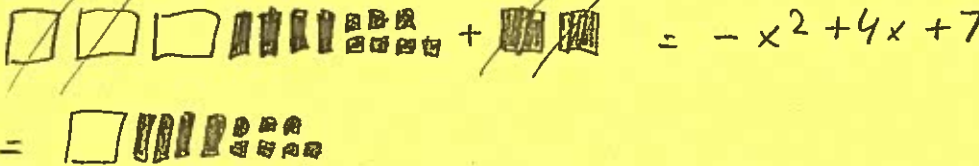   Simplify the polynomial $-4x^2 - 3x + 2x^2 - 2x + 9$.

    $$\boxed{-2x^2 - 5x + 9}$$

79. Evaluate the polynomial $5x^2 + 6x + 2$ if $x = 4$.

    $$5(4^2) + 6(4) + 2$$
    $$5(16) + 24 + 2$$
    $$80 + 26 \qquad = \boxed{106}$$

80. Model (draw algebra tiles) the sum $(-3x^2 + 4x + 7) + (2x^2)$. Then write a simplified polynomial for the sum.

    $= -x^2 + 4x + 7$

81. Determine the sum $(5x + 9) + (-2x^2 - 6x + 2)$. $= 5x + 9 - 2x^2 - 6x + 2 = \boxed{-2x^2 - x + 11}$

82. Subtract $(6x^2 + 4x - 2)$ from $(-8x^2 + 3x + 1)$ and record your result.

    $$-8x^2 + 3x + 1 - (6x^2 + 4x - 2)$$
    $$= -8x^2 + 3x + 1 - 6x^2 - 4x + 2 = \boxed{-14x^2 - x + 3}$$

83. Subtract $(x^2 - 2x + 2) - (x^2 - x + 1)$.

    $$= x^2 - 2x + 2 - x^2 + x - 1$$
    $$= 0x^2 - x + 1 \qquad = \boxed{-x + 1}$$

84. **PLO B7 Model, record and explain the operations of multiplicaton and division of polynomial expressions.**
    What multiplication does the model represent?

    ✓ not a clear copy ⇒ skip #84

85. What division does the model represent?
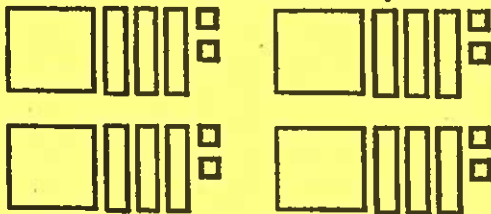
$$\frac{-4x^2 - 12x - 8}{4}$$

86. Multiply $7(2x+5)$ $4x(-2x-4)$ $2x^2(3x-6)$ $(2x+3)(9x-1) = 18x^2 - 2x + 27x - 3$

$\boxed{14x + 35}$ $\boxed{-8x^2 - 16x}$ $= \boxed{18x^2 + 25x - 3}$

$\boxed{6x^3 - 12x^2}$

87. Divide $(-9x^2 - 18x - 3) \div (-3)$ $\dfrac{24x^4 + 12x^3 - 6x^2 - 3x}{3x} = \boxed{8x^3 + 4x^2 - 2x - 1}$

$= \boxed{3x^2 + 6x + 1}$

Written response questions from various units. Please record your answers on a piece of looseleaf paper and attach to the end of the Review Booklet.
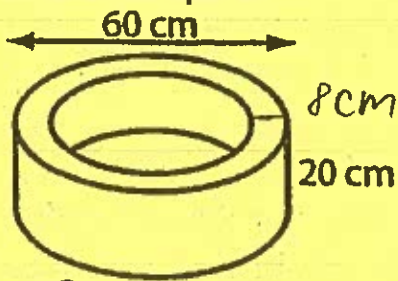
88. Explain why $-\dfrac{1}{4}$ and $\dfrac{-1}{4}$ are equivalent.

$-\dfrac{1}{4} = (-1)\left(\dfrac{1}{4}\right) = \left(\dfrac{-1}{1}\right)\left(\dfrac{1}{4}\right) = \dfrac{-1}{4}$

89. Scientists sometimes use negative values to describe the time before a major event. Suppose a scientist observed one event at −7.1 s and another event at −10.4 s. Which event occurred first? How do you know?

-10.4 s occured first as it happened 10.4 s before an event

90. Kara made a pet bed from 8 cm thick foam. She plans to cover all of it with fabric. How many square metres of fabric are required?

60 cm

8cm

20 cm

① 30cm   ② 22cm

$A_① = \pi(30)^2$
$\quad = 2827.43 \text{ cm}^2$

$A_② = \pi(22)^2$
$\quad = 1520.53 \text{ cm}^2$

$A_{1-2} = \dfrac{1306.9}{\text{cm}^2}$
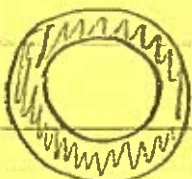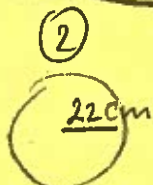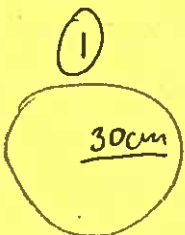
Outer side: $2\pi(30)(20) = 3769.91 \text{ cm}^2$

inner side: $2\pi(22)(12) = 1658.76 \text{ cm}^2$

$A_{total} = 11083.53 \text{ cm}^2$

$\dfrac{11083.53}{(100)^2} = \boxed{1.11 \text{ m}^2}$
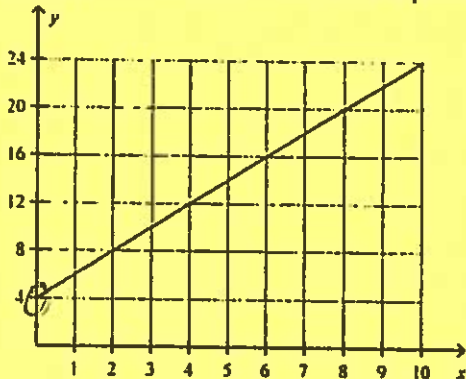
1-2

91. Write an algebraic representation for the relation.
    a) What is the y-intercept? $y = 4$ OR $(0, 4)$
    b) Whate is the rate of change, "slope". Slope $= \frac{\text{up } 4 \text{ over } 2}{} = \frac{4}{2} = \boxed{2}$
    c) Describe a context for this linear equations (make up a word problem for this graph).

Many possible answers.

A set up cost for thank you cards is $4.00. To print one card costs $2.00

$$\boxed{C = 2x + 4}$$

92. The relation $C = 7.00 + 1.00T$ is the cost of a pizza in dollars, where T is the number of toppings. Write and solve an equation to determine the number of toppings on a $10 order. Show all of your steps.

93. Sean is twice Bart's age. Ten years from now, the sum of their ages will be 32. How old is Sean now? Explain.

94. Tina was asked to determine the dimensions of a rectangle with a perimeter of 60 cm and a width 8 cm less than its length. Write and solve an equation to determine the dimensions of the rectangle. Explain.

95. Howard has 108 nickels and quarters worth $12.60. Write and solve an equation to determine how many of each coin he has. Explain.

96. Jacob has equal numbers of pennies, nickels, and quarters. He has two fewer dimes than the other coins. He has $2.67. How many of each coin does Jacob have? Explain.

97. A rectangle with a length of $5x - 3$ and a width of $3x + 2$ must have a perimeter less than or equal to 110 cm. Solve an inequality to determine the largest possible dimensions for the rectangle. Explain.

98. Express the perimeter as a polynomial. Remember to simplify.

    $x + 3$
    $x + 1$

99. Determine the dimensions of a rectangle if the area is $6x^2 + 42x$. Explain.

100. Hubert said that $(20x^2 + 10x + 15) \div (-5) = 4x^2 - 2x - 3$. Do you agree or disagree? Explain.

#92 $C = 7.00 + 1.00\,T$

$10 = 7.00 + 1.00\,T$ $|-7$

$\dfrac{3}{1} = \dfrac{1.00\,T}{1}$ $|\div 1$

$\boxed{T = 3}$ ∴ The pizza had 3 toppings.

#93

$x =$ Sean's age
$y =$ Bart's age

$x = 2y$

$(x+10) + (y+10) = 32$ $x = 2y$ ∴ Sean is 8 years
$2y + 10 + y + 10 = 32$ $x = 2(4)$ older.
$\quad 3y + 20 = 32$
$\quad\quad 3y = 12$ $\boxed{x = 8}$
$\quad\quad\boxed{y = 4}$

#94

$l = ?$ $P = 2(l + w)$
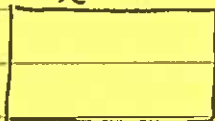
$w = l - 8$ $60 = 2(l + l - 8)$
$60 = 2(2l - 8)$
$60 = 4l - 16$
$\dfrac{76}{4} = \dfrac{4l}{4}$

$\boxed{l = 19\ cm}$

$\boxed{w = 11\ cm}$

95

$$n + q = 108 \quad \rightarrow \quad q = 108 - n$$

$$0.05n + 0.25q = 12.60$$

$$(0.05)(n) + (0.25)(108 - n) = 12.60$$

$$0.05n + 27 - 0.25n = 12.60$$
$$-0.20n = -14.40$$
$$\frac{}{-0.20} \quad \frac{}{-0.20}$$

$$\boxed{n = 72} \qquad q = 108 - 72$$
$$\boxed{q = 36}$$

∴ Howard has 72 nickles
and 36 quarters.

96 $p = n = q = x$

$$d = p + n + q - 2$$

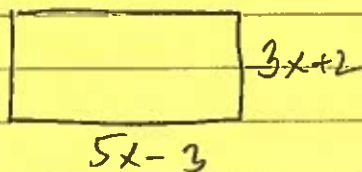$$d = x - 2$$

$$2.67 = 0.01x + 0.05x + 0.25x + 0.10(x - 2)$$

$$2.67 = 0.31x + 0.10x - 0.2$$

$$\frac{2.87}{0.41} = \frac{0.41x}{0.41}$$

$$\boxed{x = 7}$$

∴ Jacob has 7 pennies, 7 nickles, 7 quarters
and 5 dimes.

#97

$P \le 110\ cm$

$P = 2(l + u)$

$3x + 2$

$5x - 3$

$2(l + u) \le 110$
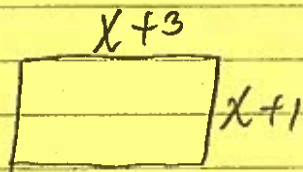
$2(5x - 3 + 3x + 2) \le 110$

$2(8x - 1) \le 110$

$16x - 2 \le 110$

$$\frac{16x}{16} \le \frac{112}{16}$$

$x \le 7$

Max. dimensions : length $\quad 5(7) - 3 = \boxed{32\ cm}$

width $\quad 3(7) + 2 = \boxed{23\ cm}$

#98

$x + 3$

$x + 1$

$P = 2(l + u)$

$P = 2(x + 3 + x + 1)$

$P = 2(2x + 4)$

$P = \boxed{4x + 8}$

#99 $A = 6x^2 + 42x$

$A = l \times w$

$\boxed{A = 6x^2 + 42x}\ w = ?$

$l = ?$

$l = \dfrac{A}{w}$

$l = \dfrac{6x^2 + 42x}{6x}$

$l = x + 7$

Many possible answers : $l = x + 7$ and $w = 6x$

OR $l = 3x + 21$ and $w = 2x$

OR $l = x^2 + 7x$ and $w = 6$

OR $l = 2x + 14$ and $w = 3x$

#100 $\dfrac{20x^2 + 10x + 15}{-5} = \dfrac{20x^2}{-5} + \dfrac{10x}{-5} + \dfrac{15}{-5}$

$= \boxed{-4x^2 - 2x - 3}$

I disagree, because Hubert forgot to divide the first term by a negative five. He divided by a positive five.