Challenging Questions that need Attention

1. 2. Which of the following coordinates are intercepts of the linear relation $5x - 2y + 20 = 0$

(65%)

A. I only
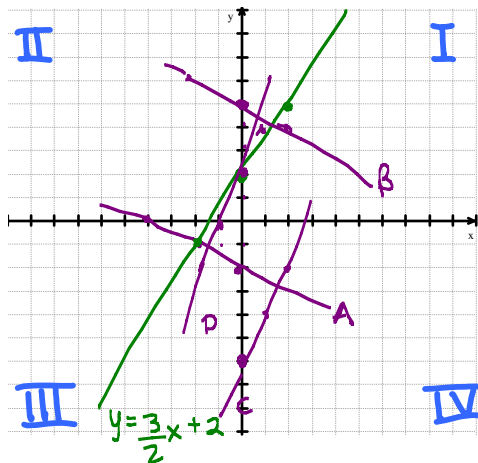B. II only
C. I and III only
D. I and IV only

I	$(-4, 0)$
II	$(-4, 10)$
III	$(0, 10)$
IV	$(0, -10)$

$$\begin{array}{c|c} x & y \\ \hline 0 & 10 \\ -4 & 0 \end{array}$$

2. Label the Quadrants: I, II, III, IV.

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

3. 4. The solution of a system of two equations occurs in Quadrant III. The first equation is $y = \frac{3}{2}x + 2$. Which of the following equations could be the second equation of the system.

(43%)

A. $y = -\frac{1}{2}x - 2$
B. $y = -\frac{1}{2}x + 5$
C. $y = 2x - 5$
D. $y = 2x + 2$

4. 9. Factor: $4m^2 - 16n^2$

$= 4(m^2 - 4n^2)$
$= 4(m - 2n)(m - 2n)$

(35%)

A. $4(m^2 - n^2)$
B. $4(m - 2n)(m + 2n)$
C. $(2m - 4n)(2m + 4n)$
D. $(4m - 16n)(4m + 16n)$

5. 11. Which calculation shows the conversion of 6780 yards to kilometres.

(67%)

A. $6780\ yd \times \frac{0.9144\ m}{1\ yd} \times \frac{1\ km}{1000\ m}$

B. $6780\ yd \times \frac{1\ yd}{0.9144\ m} \times \frac{1\ km}{1000\ m}$

C. $6780\ yd \times \frac{1\ yd}{0.9144\ m} \times \frac{1000\ m}{1\ km}$

D. $6780\ yd \times \frac{0.9144\ m}{1\ yd} \times \frac{1000\ m}{1\ km}$

Challenging Questions that need Attention

6. 15. Which of the following relations are functions?

63%

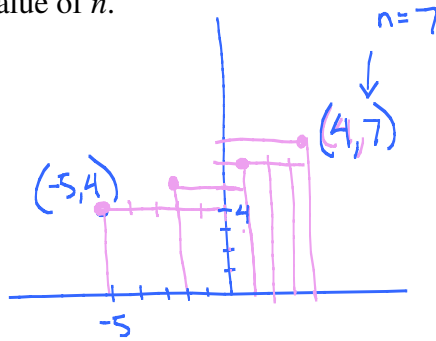| I	$(2,5),(-5,1),(0,3),(6,2)$ ✓
II	$(4,-3),(2,1),(4,5),(6,7)$ ✗
III	$(-5,2),(1,2),(3,2),(4,3)$ ✓

x-coordinates must all be unique

A. I only

B. I and III only

C. I and II only

D. II and III only

7. 16. The slope of a line segment is $\frac{1}{3}$. The segment has endpoints $A(-5,4)$ and $B(4,n)$.

Determine the value of n.

61%

A. 31

B. 7

C. $\frac{11}{3}$

D. 1

n = 7

(-5,4) (4,7)

-5

Error: Algebraic or mixing up x & y

8. 17. Two lines with slopes $\frac{3}{5}$ and $-\frac{15}{k}$ are perpendicular. Determine the value of k.

58%

A. 9

B. 25

C. −25

D. 9

$$\frac{3}{5} \perp \frac{-5}{3}$$

$$\frac{3}{5} \perp \frac{-5}{k}$$

$$\frac{-5}{3} = \frac{-15}{k} \quad \rightarrow k = 9$$

$$-5k = 3(-15)$$
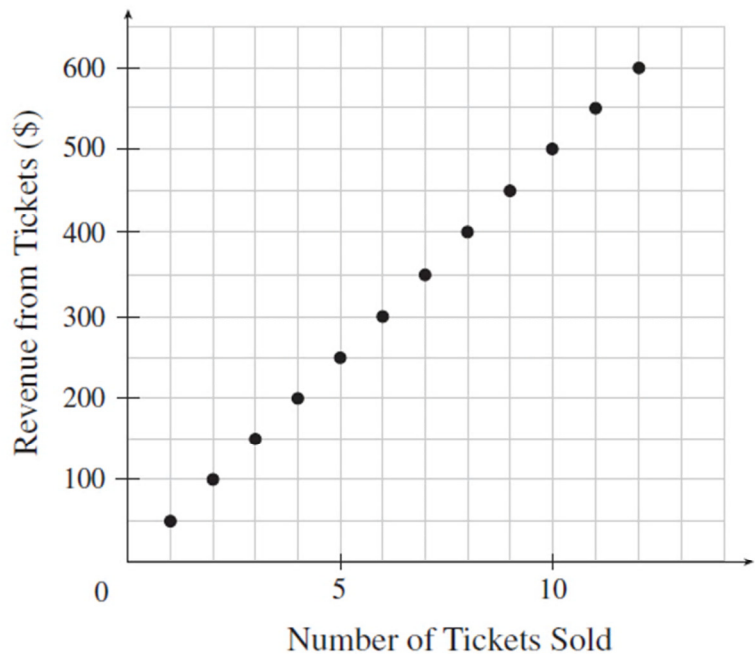
$$k = \frac{3(-15)}{-5}$$

Errors: Perp slopes opposite but not reciprocals or perp. slopes equal

9. 18. What does the slope of the graph below represent.
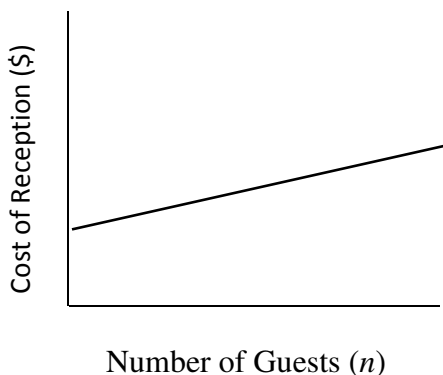
51%

$$m = \frac{rise}{run}$$

$$= \frac{\$}{tickets}$$

A. price per ticket

B. profit from tickets

C. revenue from tickets

D. number of tickets sold

Error: took slope as $\frac{run}{rise}$

Challenging Questions that need Attention

10. 23. The graph below shows the cost of a wedding reception based on the number of guests attending.

40%

Cost of Reception ($) vs Number of Guests (n)

Error:
36% said dep.
var. is x-axis.
14% chose
y-int = 0

Which of the following statements are true.

I	The dependent variable is n, Number of Guests.	✗
II	The situation represents a linear relation.	✓
III	The equation $c = 20n$ could represent this situation	✗

A. I only
B. II only ⟵
C. I and II only
D. II and III only

11. 24. Determine the equation in general form of the linear relation $y - 3 = -\frac{2}{4}(x + 5)$

58%

A. $2x + 4y - 2 = 0$ ⟵
B. $2x + y - 2 = 0$
C. $2x + 4y + 5 = 0$
D. $2x + 4y - 3 = 0$

$4y - 12 = -2(x+5)$

$4y - 12 = -2x - 10$
   $+10$ $+10$

$2x + 4y - 2 = 0$

Errors: • no
distribution
• two sign
errors.

12. 26. Determine the equation, in slope-intercept form, of a line that is perpendicular to $y = 2x + 5$ and has an x-intercept of 4 $2 \perp -\frac{1}{2}$

58%

A. $y = -\frac{1}{2}x + 4$
B. $y = -\frac{1}{2}x + 2$ ⟵
C. $y = -2x + 8$
D. $y = \frac{1}{2}x - 2$

$y = -\frac{1}{2}x + b$ x-int $(4,0)$

$0 = -\frac{1}{2}(4) + b$

$0 = -2 + b$

$2 = b$ $y = -\frac{1}{2}x + 2$

Errors.
• correct slope but
x-int for "b"
• slope not reciprocal

13. 28. Ross and Rachel rented a room at the Grand and held a dinner party for 150 of their closest friends. Each plate of dinner cost the couple $20. They spent a total of $3300, this included the rental fee of the room. Determine an equation that represents the cost, C, in dollars, as a function of the number of guests, n.

61%

A. $C(n) = 20n$
B. $C(n) = 20n + 150$
C. $C(n) = 20n + 3300$
D. $C(n) = 20n + 300$ ⟵

$C = 20n + b$

$3300 = 20(150) + b$

$3300 - 3000 = b$

$300 = b$

Error:
24% used dep
var as fixed
cost

Challenging Questions that need Attention

14.31. Solve: $4x + 3y - 15 = 0$ ①

16.$x + 12y - 60 = 0$ ②   ① × 4 = ②

A. $(0, 5)$
B. $(6, -3)$
C. There is no solution.
D. There is an infinite number of solutions.

(handwritten, circled: 61%)

*(handwritten: Error:
• didn't notice it is the same line & picked the first point
• Saw slopes same & thought //)*

15.32. Two planes have a cruising speed of 570 km/h without wind. The first plane flies for 12 hours against a constant headwind. The second plane flies for 10 hours in the opposite direction with the same wind (a tailwind). The second plane flies 370 km less than the first plane.

Determine two equations that could be used to solve for the wind speed, w, and the distance travelled by the first plane, d.

① $(570 - w)12 = d$

② $(570 + w)10 = d - 370$

A. $(570 - w)(12) = d$
    $(570 + w)(10) = d - 370$
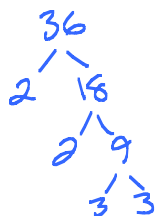
B. $(570 - w)(12) = d$
    $(570 + w)(10) = d + 370$

C. $(570 + w)(12) = d$
    $(570 - w)(10) = d - 370$

D. $(570 + w)(12) = d$
    $(570 - w)(10) = d + 370$

(handwritten, circled: 62%)

(handwritten: Error: distances reversed.)

16.33. How many different prime factors does 36 have?

A. 2
B. 3
C. 4
D. 8

(handwritten tree: 36, 2 18, 2 9, 3 3)

$36 = 2 \cdot 2 \cdot 3 \cdot 3$

Prime Factors: 2 & 3
(1 is not prime)

(handwritten, circled: 36%)

*(handwritten: Error:
• choose # factors in prime factorization or include the #1.)*

17.34. Match each of the following numbers to the classification of the type of number. Each number will match up with more than one category.

-7 Natural

0 Whole

7 Integers

$\sqrt{7}$ Rational

              Irrational

(handwritten, circled: 52%)
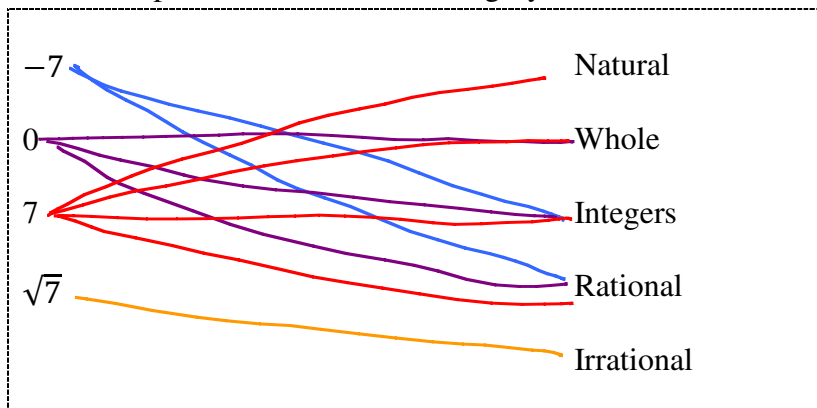
*(handwritten: Error
• natural #)*

Challenging Questions that need Attention

16. 37. The population of bunnies in Kelowna doubles every year. There are currently 200 bunnies. When will there be more than 10 000 bunnies?

(60%)

    A. 5
    B. 6
    C. 7
    D. 50

Handwritten work: $200 \quad 400 \quad 800 \quad 1600 \quad 3200 \quad 6400 \quad 12800$ ($\times 2$), 1000

Error: Overestimated

19. 38. Simplify: $(4m^2n^3)^2 \div (8m^3n^4)^2$

(61%)

    A. $\dfrac{1}{2m^2n^2}$
    B. $\dfrac{1}{4m^2n^2}$
    C. $\dfrac{n}{2m}$
    D. $\dfrac{n}{4m}$

Handwritten work: $\dfrac{16m^4n^6}{64m^6n^8} = \dfrac{1}{4m^2n^2}$
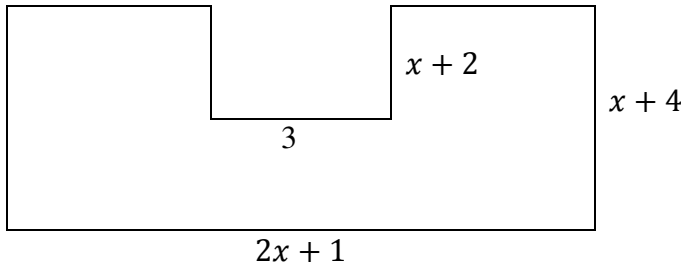
Error: Powers weren't applied to coefficients.

20. 39. Simplify: $\left(\dfrac{64m^2n}{8m^{-4}n^4}\right)^{\frac{4}{3}}$

(39%)

    A. $\dfrac{8m^8}{n^4}$
    B. $\dfrac{8m^5}{n^4}$
    C. $\dfrac{16}{m^5n^4}$
    D. $\dfrac{16m^8}{n^4}$

Handwritten work: $= \left(8m^{2--4}n^{-3}\right)^{\frac{4}{3}}$
$\sqrt[3]{8}^4 \left(m^6\right)^{\frac{4}{3}}\left(n^{-3}\right)^{\frac{4}{3}}$
$= 2^4 m^8 n^{-4}$
$= \dfrac{16m^8}{n^4}$

Error: Powers not applied to coefficients. When subtracting neg exponent from positive

21. 42. Timmy used the following steps to find the area of the shape below

(47%)

Diagram labels: $x+2$, $x+4$, 3, $2x+1$

I	$A = (2x+1)(x+4) - 3(x+2)$
II	$A = 2x^2 + 8x + x + 4 - 3(x+2)$
III	$A = 2x^2 + 9x + 4 - 3x + 6$
IV	$A = 2x^2 + 6x + 10$

Which step did Timmy make a mistake?
    A. I
    B. II
    C. III
    D. IV

Error: 20% Choose 1st step, 25% Choose no mistake

Challenging Questions that need Attention

22. **43.** Which of the following expressions have a factor of $x - 6$

I	$x^2 + 36$
II	$3x^2 - 14x - 24$
III	$4x(x-6) + 5(x-6)$

(handwritten:) I: — sum of squares – can't factor
III: $(x-6)(4x+5)$ ✓

A. I only
B. II only
C. I and III only
D. II and III only *(D circled)*

(handwritten work:)
$3x^2 - 14x - 24$ $3(-24)$
$= 3x^2 - 18x + 4x - 24$ $= -72$
$= 3x(x-6) + 4(x-6)$ $18 \quad 4$
$= (x-6)(3x+4)$

(27% circled in red, left margin)
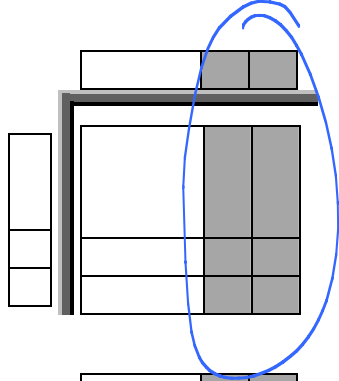
(right margin, red:)
Error:
- Factor of sum of squares
- Not factoring trinomial with leading coefficient correctly.

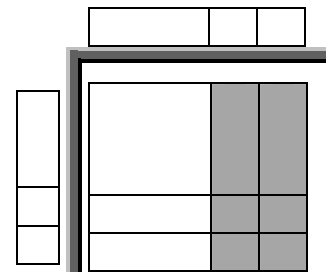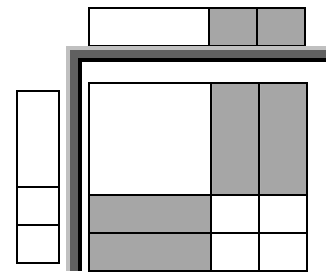**23.** **44.** Which picture best represents the factoring of $x^2 - 4$

(65% circled in red, left margin)

A. *(circled)*   B.

(handwritten blue, circling a figure:) look for negatives in a group of rectangle

C.   D.

(right margin, red:)
Error
- Incorrect "Shape"
- not seeing a rectangle

24 **45.** Which mass in the following list is the heaviest?

(58% circled in red, left margin)

480 000 g   2150 kg   4600 pounds   4.3 ~~tonnes~~ *imperial tons*
$= 480$ kg

$4600 \text{ lbs} \times \dfrac{0.454 \text{ kg}}{1 \text{ lb}}$ $4.3 \text{ ton} \times \dfrac{2000 \text{ lbs}}{1 \text{ ton}} \times \dfrac{0.454 \text{ kg}}{1 \text{ lb}}$

$= 2088.4$ kg $= 3904.4$ kg

A. 480 000 g
B. 2150 kg
C. 4600 pounds
D. 4.3 ~~tonnes~~ *(circled)* imperial tons

25. **46.** What is a good estimate of the length of one regular step?

(66% circled in red, left margin)

A. 1 foot
B. 1 metre *(circled)*
C. 300 cm
D. 2 yards

(right margin, red:)
Error:
- Very short length of step (toe – heel)?

Challenging Questions that need Attention

26 48. A shed with length 3m, width 2m, and height 2m, needs to be painted. The total area of the door is ~~1.5~~ $\frac{3}{2}m^2$ and does not get painted. There are two options for buying paint, as show below. Determine the cheapest cost to paint the exterior walls and roof of the shed.

42%

$4.50

$ 15.00

Errors:
- Included door
- Overestimated paint
- Included floor.
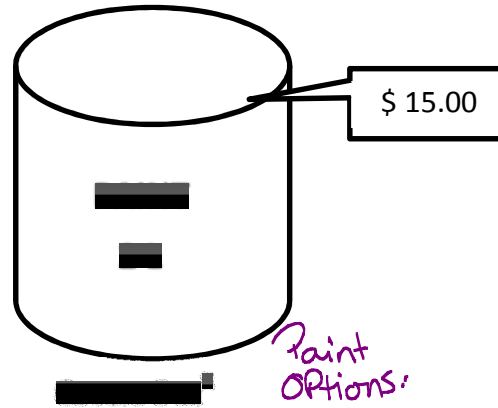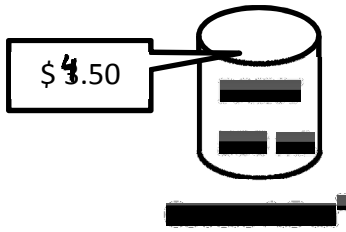
A. $ ~~52.00~~ 45.00
B. $ ~~55.50~~ 58.50
C. $ ~~56.00~~ 60.00
D. $ ~~62.00~~ 67.50

Paint Options:

$SA = 3(2)(2) + (2)(2)(2) + 3(2) - 3$
$= 22 \ m^2$

$6 + 6 + 6 + 6 = 24 \Rightarrow 4(15) = ^\$60$

$3(6) + 3(1.5) = 22.5 \Rightarrow 3(15) + 3(4.50)$
$= 58.50$

$15(1.5) = 22.5 \Rightarrow 15(4.50)$
$= 67.5$

27 49. A cone has a radius of 5 cm and slant height 13 cm. Calculate the volume of the cone.

58%

A. 340.34 cm^2
B. 314.16 cm^2
C. 364.64 cm^2
D. 942.48 cm^2

Error
- used slant height for height.
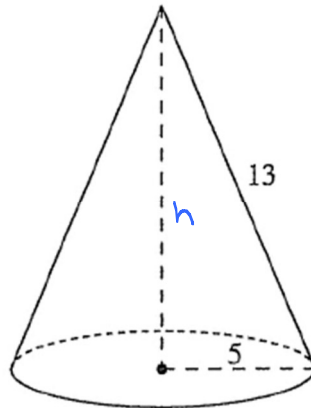
$h^2 = 13^2 - 5^2$

$h = 12$

$V = \frac{1}{3} \pi r^2 h$

$V = \frac{1}{3} \pi (5)^2 (12)$

$= 314.16$

Challenging Questions that need Attention

28. 50. Tiffany & Co. offers a tennis ball set that consist of four tennis balls packaged in a sterling silver container. The container keep the tennis balls at optimal playing temperature and sells for $1500. If the four tennis balls are stacked in the container and fit perfectly, with no wiggle room, how much empty space is inside the cylinder. Note that a tennis ball has a radius of 3.35cm.

(64% circled)

$$V_{cylinder} = \pi r^2 h$$
$$r = 3.35$$
$$h = (3.35 \times 2) \times 4 = 26.8$$
$$V = \pi (3.35)^2 (26.8)$$
$$= 944.87$$

Error:
- Used radius instead of diameter to calc. height
- Just subtracted one sphere.

A. 157 cm³
B. 315 cm³
C. 757 cm³ *(circled)*
D. 945 cm³
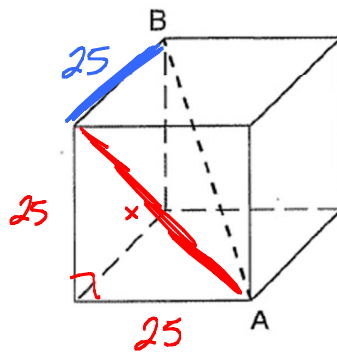
$$V_{sphere} = \frac{4}{3}\pi r^3$$
$$= \frac{4}{3}\pi (3.35)^3 \times 4$$
$$= 188.03$$

29. 52. Polar Company has designed an ice block in the shape of a cube. The volume of the cube is 15 625 cm³. Which of the following dimensions is the smallest opening of an ice dispenser that will accommodate length AB?

(65% circled)

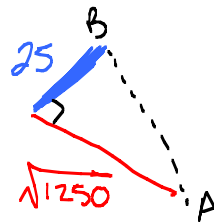$$V = lwh$$
$$V = l^3$$
$$15625 = l^3$$
$$\sqrt[3]{15625} = l$$
$$l = 25$$

A. 25 cm wide
B. 40 cm wide
C. 45 cm wide *(circled)*
D. over 50 cm wide

$$25^2 + 25^2 = x^2$$
$$x = \sqrt{1250}$$

$$25^2 + \sqrt{1250}^2 = AB^2$$
$$1875 = AB^2$$
$$AB = 43.3$$