

Released 2013
Achievement
Test

Mathematics

GRADE
9

Alberta  Government

Use the following information to answer question 1.

$\sqrt{51}$ $\sqrt{55}$ $\sqrt{61}$ $\sqrt{66}$ $\sqrt{71}$ $\sqrt{77}$ $\sqrt{81}$ $\sqrt{88}$

1. How many of the square roots shown above have a value that is between 7.8 and 8.8?

- A. 2
- B. 3
- C. 4
- D. 5

- 7.8 is the square root of : $7.8 \times 7.8 = 60.84$
 - 8.8 is the square root of : $8.8 \times 8.8 = 77.44$
 - therefore, you are looking for numbers bigger than 60.84 and smaller than 77.44

61, 66, 71 and 77

Use the following information to answer numerical-response question 1.

Members of a recreation centre pay a one-time registration fee in addition to a fixed monthly fee of \$15. The following table shows the total amount paid to be a member of the centre for a certain number of months.

Number of Months	Total Amount Paid
4	\$135
6	\$165
12	\$255

Numerical Response

1. According to the information above, what is the cost of the one-time registration fee?

Answer: \$75 dollars

(Record your answer in the numerical-response section on the answer sheet.)

$\$135 = 4x + m$ $m = \text{monthly fee}$

$135 = 4(15) + m$

$m = 135 - 60 \Rightarrow m = \75

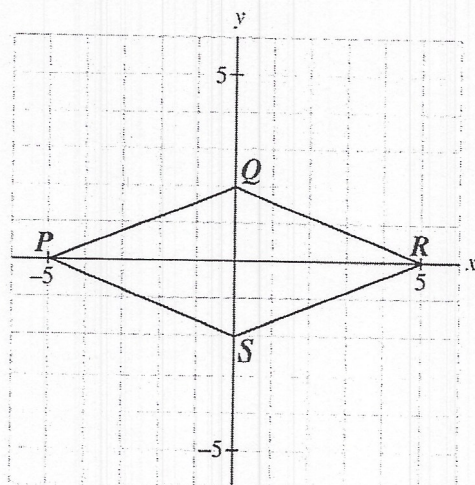
Prove it:

$\$165 = 6(15) + 75$

\downarrow
 $90 + 75 \rightarrow \$165$. It works

Use the following information to answer question 2.

The 2-D shape shown below is rotated about its centre.



2. What are the order of rotational symmetry and the angle of rotation of the 2-D shape?

Row	Order of rotational symmetry	Angle of rotation
A.	1	180°
B.	1	360°
C.	2	180°
D.	2	360°

- Order of 1 means a figure only matches itself after a whole 360° rotation
- The figure above matches at 180° and 360°. This means an order of symmetry of 2.
- Angle of rotation = $\frac{360^\circ}{\text{ORDER R.S.}} = \frac{360^\circ}{2} = 180^\circ$

Use the following information to answer question 3.

Two students, Robert and Jacob, simplify the expression $3(x^2 + 4x - 1) - (2x + 5)$, as shown below.

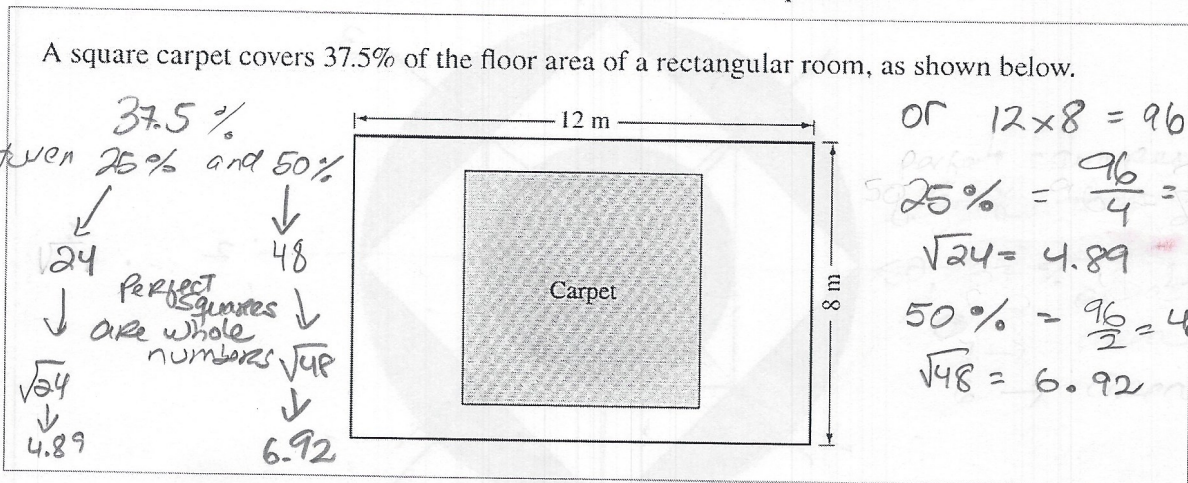
	Robert	Jacob
Step 1	$= 3x^2 + 12x - 3 - (2x + 5)$	$= 3x^2 + 12x - 1 - (2x + 5)$
Step 2	$= 3x^2 + 12x - 3 - 2x + 5$	$= 3x^2 + 12x - 1 - 2x - 5$
Step 3	$= 3x^2 + 10x + 2$	$= 3x^2 + 10x - 6$

3. The first error made in the simplification of the expression shown above was made by

- A. Robert in Step 1
- B. Jacob in Step 1
- C. Robert in Step 2
- D. Jacob in Step 2

FIRST → Distributive property
 $3(x^2 + 4x - 1) = 3x^2 + 12x - 3$. Robert
 Did this on step 1.
 Jacob said $3(x^2 + 4x - 1) = 3x^2 + 12x - 1$
 which is NOT correct

Use the following information to answer question 4.



4. What is the side length of the carpet shown above?

- A. 7 m
- B. 6 m
- C. 5 m
- D. 4 m

Since 37.5% represents the square rug, then

$$A = 36$$

$$\text{Side length} = \sqrt{36} = 6$$

Method 1

Set up ratio

Area of Room: $b \times h = 12 \text{ m} \times 8 \text{ m} = 96 \text{ m}^2$

Since $96 \text{ m}^2 = 100\%$

$$\frac{96 \text{ m}^2}{100\%} = \frac{x}{37.5\%}$$

$$x = \frac{96 \text{ m}^2 \times 37.5\%}{100\%}$$

Method 2

Area of Room = 96 m^2

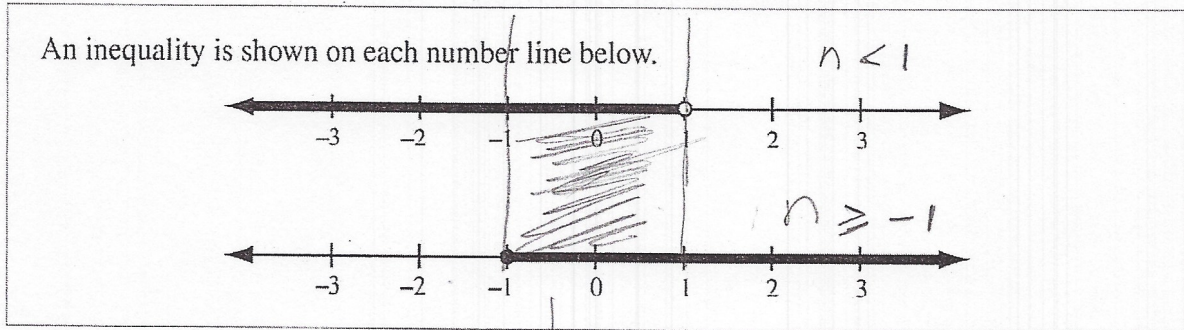
Perfect squares before 96

1 4 9 16 25 36 49 64 81

50% of 96 (half) is: 48.50 81 is too high

75% is: 48.50 + 24.25 = 72.75 (64 too high) $x = 36$

Use the following information to answer question 5.



5. Which expression represents the values (n) that are part of both inequalities?

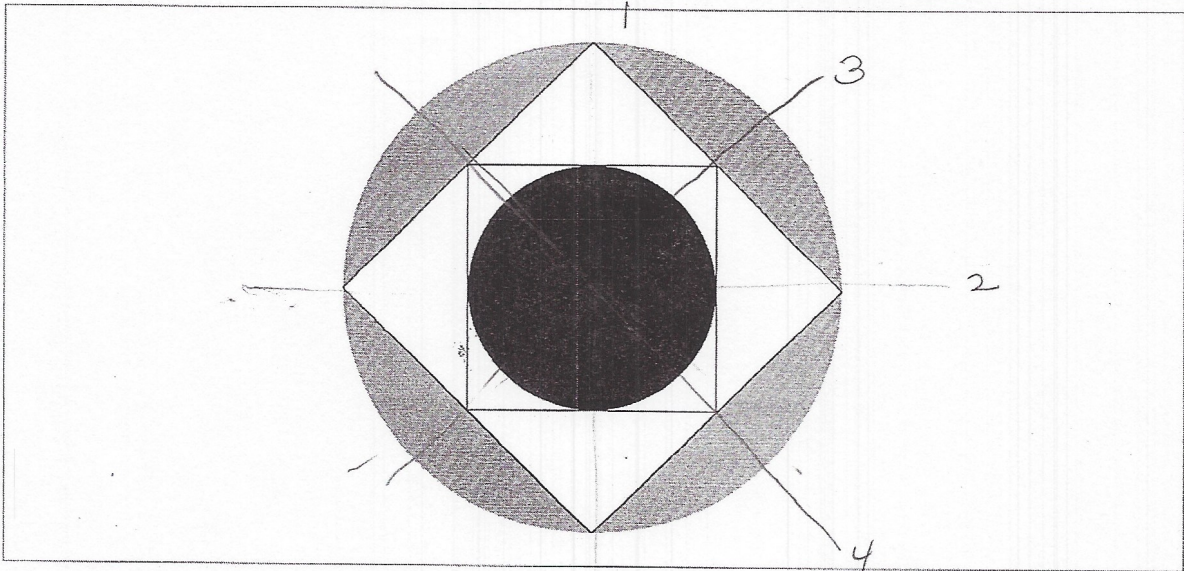
- A. $-1 \leq n \leq 1$
- B. $-1 \leq n < 1$
- C. $-1 < n \leq 1$
- D. $-1 < n < 1$

so

$n \geq -1$ and $n < 1$

$-1 \leq n < 1$ (same, written differently)
 $1 > n \geq -1$

Use the following diagram to answer numerical-response question 2.



Numerical Response

2. How many lines of symmetry does the diagram shown above have?

Answer: 4 lines

(Record your answer in the numerical-response section on the answer sheet.)

Make sure you turn the rectangles so they look like the original one! Use corresponding sides!

Use the following information to answer question 6.

Four-sided Polygons

Original to 4

$$\frac{New}{Old} = \frac{3}{3} = 1$$

$$\frac{New}{Old} = \frac{2}{1} = 2$$

↓
sides don't have same SF,

2 #3

original 3

3

#4 2

Original to 3

$$S.F = \frac{New}{Old} = \frac{6}{3} = 2 \checkmark$$

$$1 \frac{New}{Old} = \frac{2}{1} = 2$$

6. Which of the polygons above is proportional to the shaded rectangle?

- A. 1
- B. 2
- C. 3
- D. 4

Scale factor = $\frac{old}{New}$

← confirms this

Right off the bat, # 1 and 2 can not be correct because width didn't change (scale factor is different)

4 is out because length did not change

Use the following information to answer question 7.

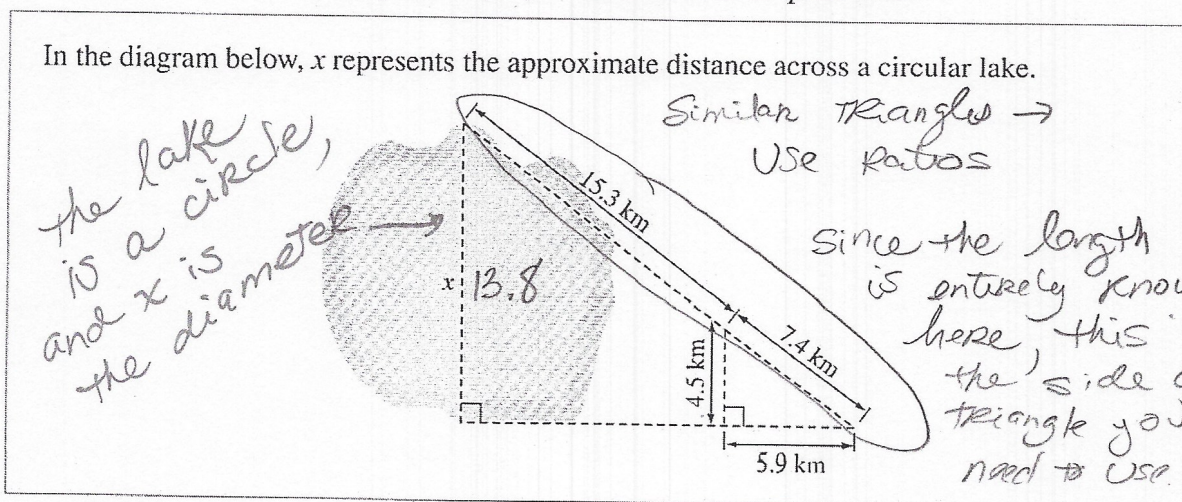
A teacher placed a cafeteria coupon in only one of three differently coloured envelopes. A randomly selected student was asked to choose one of the three envelopes. The student chose the red envelope because red was his favourite colour.

7. The student's decision was based on

- A. subjective judgment
- B. theoretical probability
- C. experimental probability
- D. mathematical calculation

Student based choice on a personal feeling.

Use the following information to answer question 8.



8. What is the approximate area of the lake, to the nearest square kilometre?

- A. 599 km²
- B. 272 km²
- C. 150 km²
- D. 68 km²

$$\frac{4.5 \text{ km}}{7.4 \text{ km}} = \frac{x}{(15.3 + 7.4) \text{ km}}$$

$$22.7 \text{ km}$$

$$\frac{(22.7)(4.5) \text{ km}^2}{7.4 \text{ km}}$$

$x = 13.8$
 • Notice that 13.8 is the diameter.
 $r = \frac{13.8}{2} = 6.9$
 $A = \pi r^2 = \pi (6.9)^2 = 149.5$
 $\hookrightarrow 150$

Numerical Response

3. If $(x^3)^2 \div x^4 = 144$, then what is the whole number value of x ?

Answer: 12

(Record your answer in the numerical-response section on the answer sheet.)

$$(x^3)^2 \div x^4 = 144$$

$$\frac{x^6}{x^4} = 144 \quad \text{then} \quad \frac{x \cdot x \cdot x \cdot x \cdot x \cdot x}{x \cdot x \cdot x \cdot x} = 144$$

$$x \cdot x = 144$$

$$\boxed{x=12}$$

144 is a perfect square $\rightarrow 12 \cdot 12$

OR \downarrow

$$x^{6-4} = x^2 = 144 \quad \text{or} \quad x = \sqrt{144} = 12$$

Use the following information to answer question 9.

Legend

■ = 1	▬ = x	■ = x ²
□ = -1	▬ = -x	□ = -x ²

The left and right sides of an equation are represented below.

$$2x - 5 = -5x + 2$$

Left side	Right side

9. The solution to the equation above can be represented by

A. =

B. =

C. =

D. =

$$2x - 5 = -5x + 2$$

$$2x + 5x = 2 + 5$$

$$7x = 7$$

$$x = \frac{7}{7} = 1$$

Since is x

then answer is =

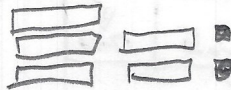
Right Side

Now add 6 to left side

Each =

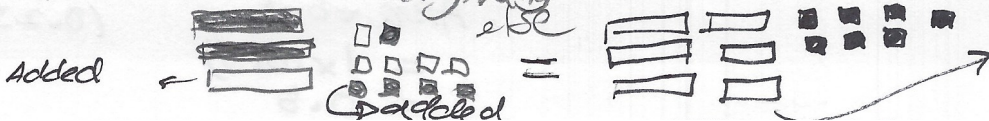
So $x = 1$

Using Tiles

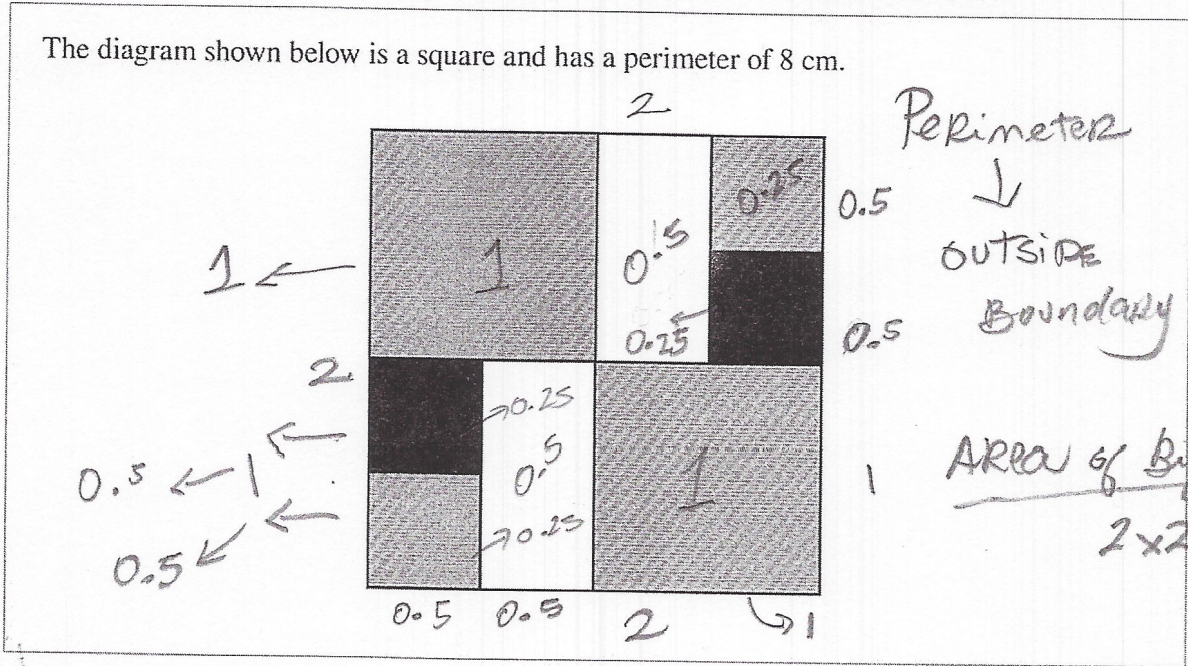


You want only on this side, so add tiles to make zero pairs and eliminate everything else.

whatever you do to one side, do to other side. Eliminate these by adding 6 .



Use the following information to answer numerical-response question 4.



Numerical Response

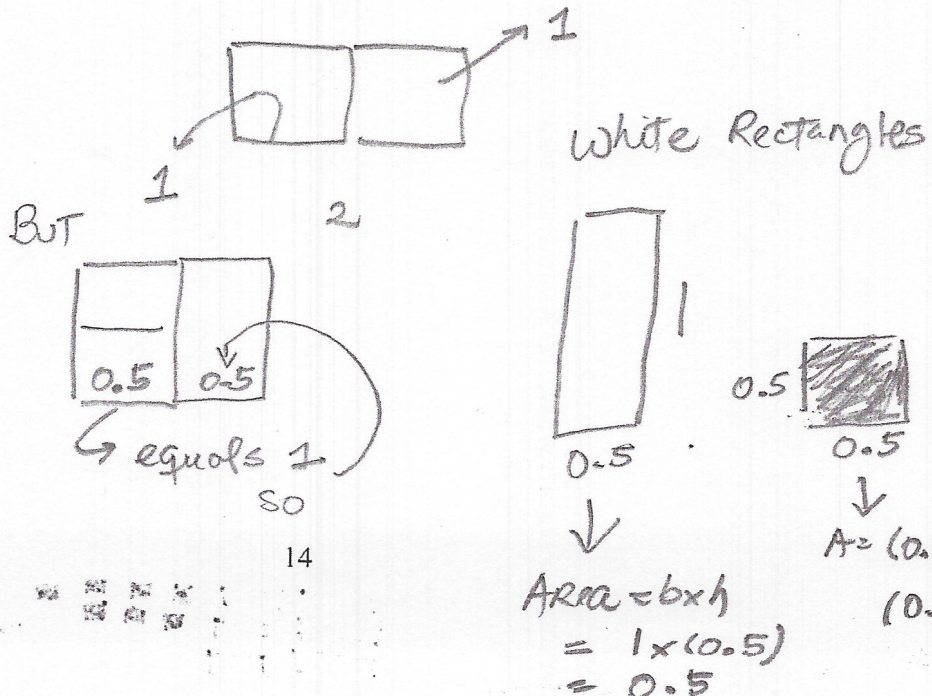
4. What is the total area of the white rectangles and the black squares?

Answer: 1.5 cm^2

There are 2 $\square = 2 \times 0.5 = 1$
there are 2 $\blacksquare = 2 \times 0.25 = 0.50$

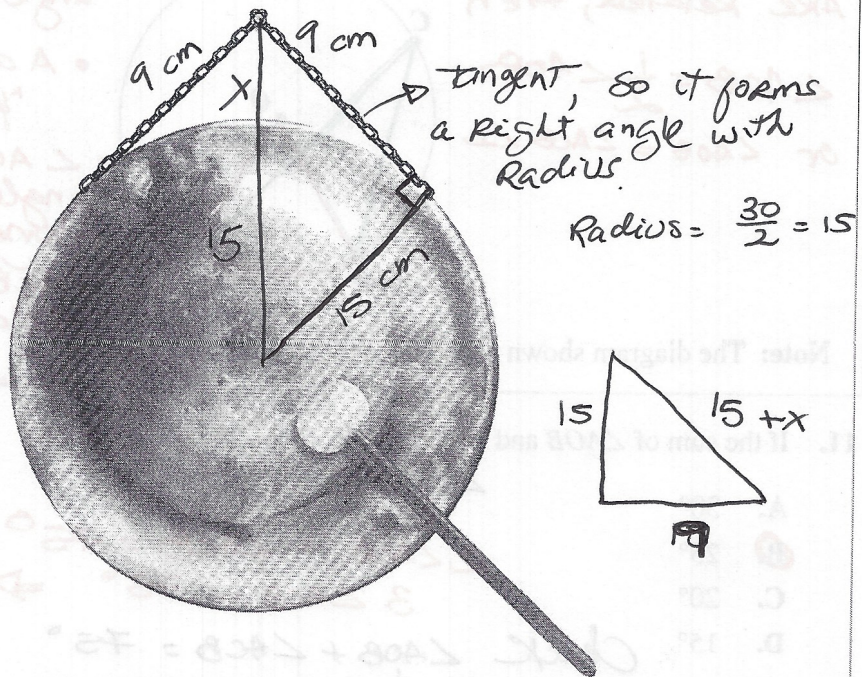
(Record your answer in the numerical-response section on the answer sheet.)

Since each side is 2 units
($P = 2 + 2 + 2 + 2 = 8$)



Use the following information to answer question 10.

The gong shown below is 30 cm in diameter and hangs by a chain from a nail. The total length of the chain is 18 cm. The lengths of chain on each side of the nail are equal to each other and form a tangent to the gong.



Note: The diagram shown above has **not** been drawn to scale.

10. How far above the top of the gong is the nail, to the nearest tenth of a centimetre?

- A. 2.3 cm
- B. 2.5 cm**
- C. 12.0 cm
- D. 17.5 cm

$$15 + x = \sqrt{(15)^2 + (9)^2}$$

↓
hypotenuse =

$$15 + x = \sqrt{225 + 81}$$

$$15 + x = \sqrt{306}$$

$$15 + x = 17.5$$

$$x = 17.5 - 15 = 2.5 \text{ cm}$$

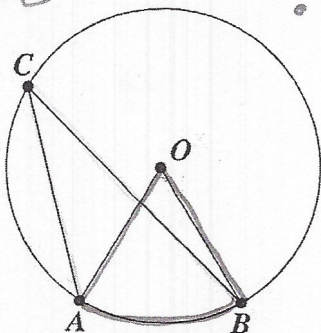
Use the following information to answer question 11.

The letter O in the diagram below represents the centre of the circle.

Since $\angle AOB$ and $\angle ACB$ are related, then

$$\angle ACB = \frac{1}{2} \angle AOB$$

$$\text{or } \angle AOB = \angle ACB \times 2$$



• $\angle AOB \rightarrow$ is a central angle

• A and B are "parents"

• $\angle ACB$ is an inscribed angle because it is found along the circumference

• $\angle ACB$ and $\angle AOB$ are related (both come from A and B)

Note: The diagram shown above has **not** been drawn to scale.

11. If the sum of $\angle AOB$ and $\angle ACB$ is 75° , then $\angle ACB$ equals

A. 30°

B. 25°

C. 20°

D. 15°

$$\angle AOB + \angle ACB = 75^\circ$$

$$2\angle ACB + \angle ACB = 75^\circ$$

$$3\angle ACB = 75^\circ \Rightarrow$$

$$\angle ACB = \frac{75^\circ}{3} = \underline{\underline{25^\circ}}$$

Check $\angle AOB + \angle ACB = 75^\circ$

$$2 \times \angle ACB + \angle ACB = 75^\circ$$

$$2(25) + 25 = 75^\circ \quad \text{It checks}$$

Use the following information to answer question 12.

Nina and Sarah observe that 6 of their 10 female classmates are shorter than 160 cm. Nina concludes that of the 410 students in their school, 246 are shorter than 160 cm. Sarah believes Nina's conclusion cannot be supported by her observation.

12. Which of the following statements **best** supports Sarah's belief?

- A. Nina's survey sample contains only female students. \rightarrow ~~is part of her class~~ TRUE and because males
- B. Nina's probability calculation is incorrect. \rightarrow CORRECT calculation
- C. Nina did not use a proper questionnaire. We know of no survey or questionnaire used
- D. Nina completed her survey too quickly. \rightarrow Can't tell

Nina:

6 out of 10 = 60%. She assumed that 60% of 410 students, 246 students, are shorter than 160 cm.

There is no indication that their school is an all-girls school. This being the case, one can't assume all 246 students will be female!

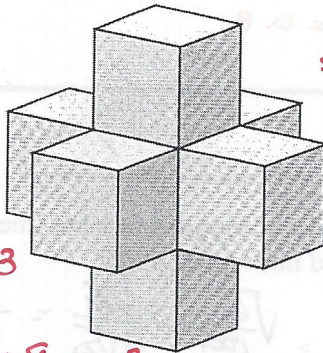
Use the following information to answer question 13.

The following 3-D object is composed of identical cubes. The volume of the 3-D object is 56 cm^3 .

• Figure made of 7 cubes

• Since Volume is independent of overlaps, then

$$\text{Volume of 1 cube} = \frac{56 \text{ cm}^3}{7} = 8 \text{ cm}^3$$



So, Volume = 8 cm^3
1 cube = 8 cm^3

Volume = $l \times h \times w = 8$

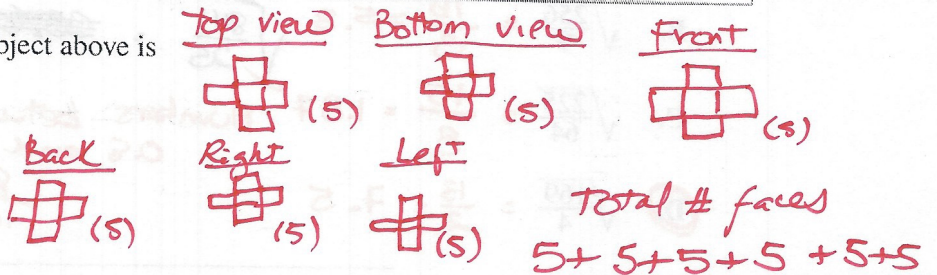
then each side is

2 cm in length

So each face has Area of 4 cm^2

13. The surface area of the 3-D object above is

- A. 30 cm^2
- B. 60 cm^2
- C. 120 cm^2**
- D. 144 cm^2



Since each face has an area of 4 cm^2
then $30 \times 4 = 120 \text{ cm}^2$

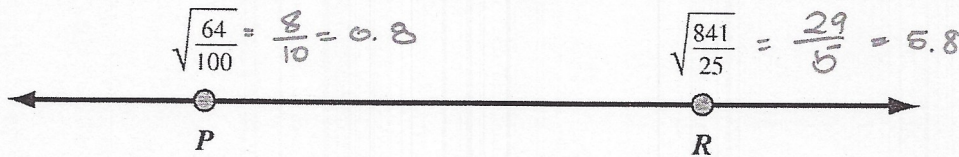
14. Which of the following expressions represents the addition of 7^2 and 7^3 ?

- ~~A.~~ $(7+7)^{2+3}$
 - ~~B.~~ $(7+7)^{2 \times 3}$
 - C.** $(7 \times 7) + (7 \times 7 \times 7)$
 - D. $(7+7) \times (7+7+7)$
- Bases that are equal do not get added!

$$\begin{array}{r}
 7^2 + 7^3 \\
 \downarrow \quad \downarrow \\
 (7 \times 7) + (7 \times 7 \times 7) \\
 \downarrow \quad \downarrow \\
 49 + 343 = 392
 \end{array}$$

Use the following information to answer question 15.

The square roots of two rational numbers are represented on the number line shown below.



15. If Q is located between points P and R on the number line above, then which of the following square roots could **not** represent Q ?

- A. $\sqrt{\frac{324}{81}} = \frac{18}{9} = 2$ ✓ $\sqrt{\frac{64}{100}} = \frac{\sqrt{64}}{\sqrt{100}} = \frac{8}{10} = 0.8$
- B. $\sqrt{\frac{256}{9}} = \frac{16}{3} = 5.3$ ✓ $\sqrt{\frac{841}{25}} = \frac{\sqrt{841}}{\sqrt{25}} = \frac{29}{5} = 5.8$
- C. $\sqrt{\frac{225}{64}} = \frac{15}{8} = 1.87$ ✓ Numbers between 0.8 and 5.8, or $\frac{29 \times 2}{5 \times 2} = \frac{58}{10}$
- D. $\sqrt{\frac{169}{4}} = \frac{13}{2} = 6.5$ ✓ $\frac{8}{10}$ and $\frac{58}{10}$

Use the following information to answer numerical-response question 5.

A scientific calculator has 40 buttons, of which $\frac{1}{4}$ are white, $\frac{1}{5}$ are grey, and 4 are orange. The rest of the buttons are black.

Numerical Response

5. How many black buttons does the calculator have?

Answer: 18

(Record your answer in the numerical-response section on the answer sheet.)

$$40 \times \frac{1}{4} = \frac{40}{4} = 10 \text{ white}$$

$$40 \times \frac{1}{5} = \frac{40}{5} = 8 \text{ grey}$$

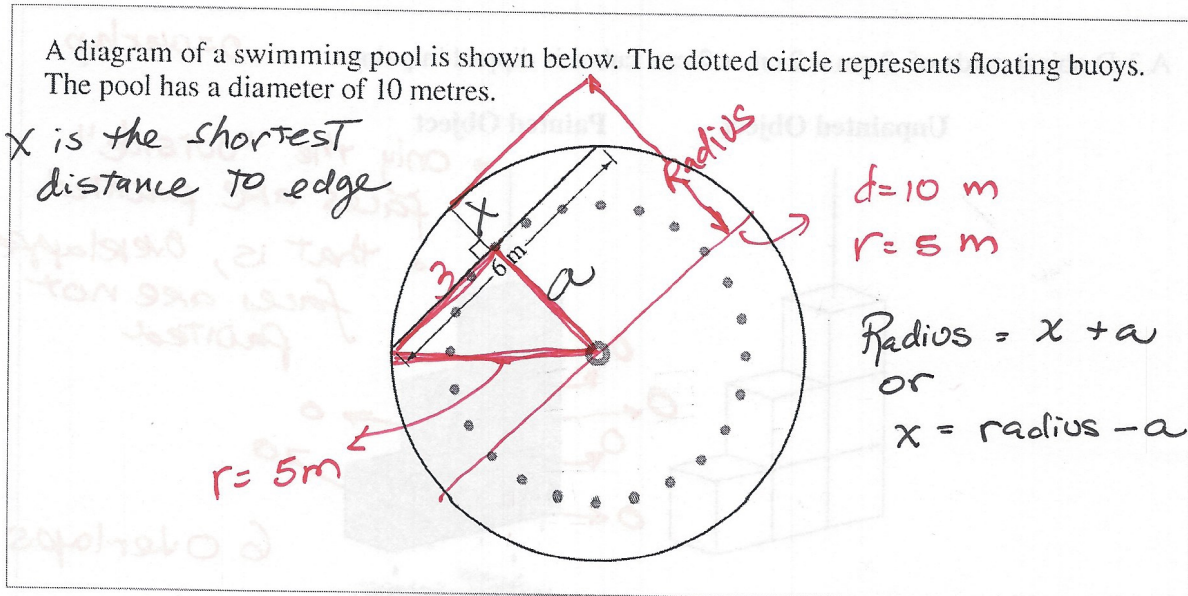
4 Orange

Black, then:

$$40 - 22 = 18 \text{ are black}$$

22 Non-black

Use the following information to answer question 16.



16. The shortest distance from the buoys to the edge of the pool is

- A. 1 m
- B. 2 m
- C. 3 m
- D. 4 m

to find a , use

$$a = \sqrt{c^2 - b^2} = \sqrt{5^2 - 3^2} = \sqrt{25 - 9} = \sqrt{16}$$

$$a = 4\text{ m}$$

But since $x = \text{radius} - a$, then $x = 5 - 4 = 1\text{ m}$

Use the following information to answer question 17.

Tara, Jennifer, and Mindy donated some money to a charity. Jennifer donated twice as much as Tara, and Mindy donated \$10 less than Jennifer.

17. If the **total** amount donated to the charity is \$50, then how much money did Tara donate?

- A. \$6
- B. \$8
- C. \$12
- D. \$24

$$\text{Jennifer} = 2T$$

$$\text{Mindy} = \text{Jennifer} - 10 = 2T - 10$$

$$T = ?$$

$$50 = 2T + (2T - 10) + T$$

Jennifer + Mindy + Tara

$$50 = 2T + 2T - 10 + T$$

"like terms"

$$50 = 5T - 10$$

19

$$50 + 10 = 5T$$

$$60 = 5T \Rightarrow$$

$$T = \frac{60}{5} = 12$$

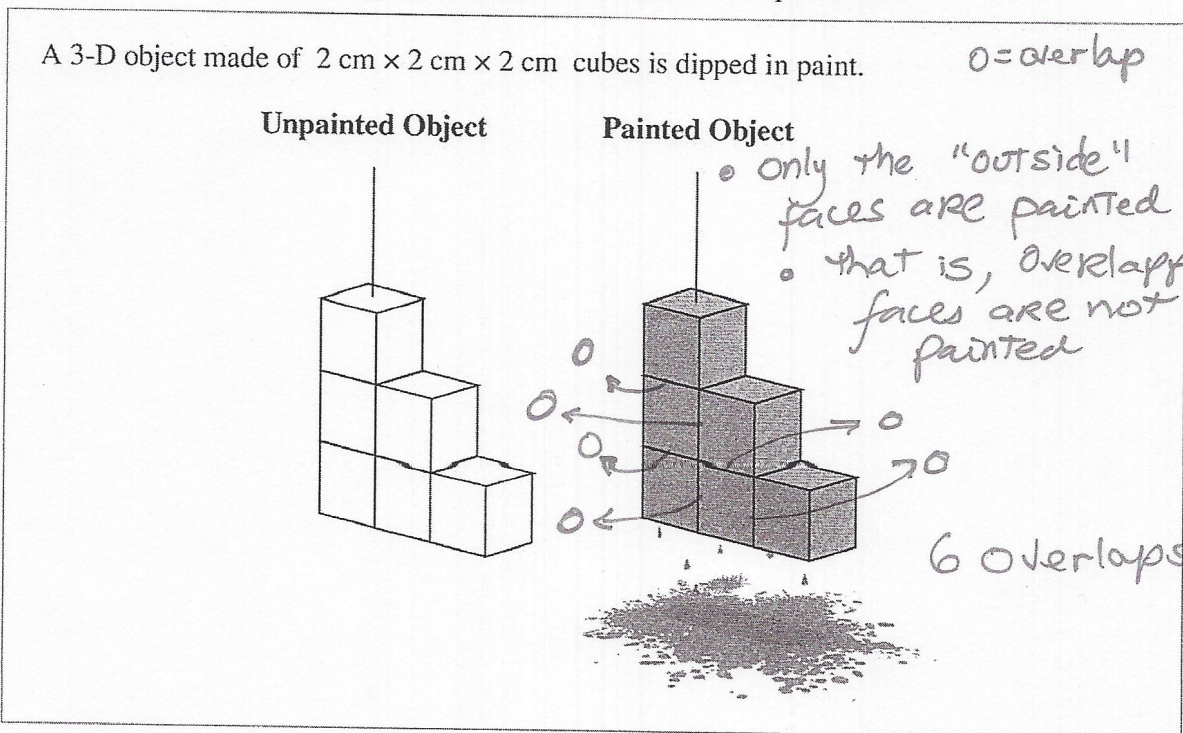
check

$$2T + (2T - 10) + T$$

$$2(12) + (2(12) - 10) + 12$$

$$24 + 14 + 12 = \$50$$

Use the following information to answer question 18.



18. If the painted object is separated into individual cubes, then the total area of the **unpainted** surfaces will be

- A. 12 cm^2
 B. 24 cm^2
 C. 32 cm^2
 D. 48 cm^2

• Unpainted faces \rightarrow Overlaps

$6 \times 2 = \text{Overlapped faces} = \underline{\underline{12}}$

• Each face is $\square^2 = 4\text{ cm}^2$

• So, $12 \times 4\text{ cm}^2 = 48\text{ cm}^2$

19. Which pair of expressions below are equivalent for all values of x ?

- A. $-3x + 4x^2 + 2$ and $4x^2 - 2 + 3x$
 B. $-3x + 4x^2 + 2$ and $2 - 3x + 4x^2$
 C. $2 - 4x^2 + 3x$ and $-4x^2 + 3x - 2$
 D. $2 - 4x^2 + 3x$ and $-3x + 4x^2 + 2$

• Rewrite expressions so that it is easier to compare

A. $4x^2 - 3x + 2$
 $4x^2 + 3x - 2$ $>$ NOT equivalent

B. $4x^2 - 3x + 2$
 $4x^2 - 3x + 2$ $>$ Equivalent

C. $-4x^2 + 3x + 2$
 $-4x^2 + 3x - 2$ $>$ NOT equivalent

D. $-4x^2 + 3x + 2$
 $4x^2 - 3x + 2$ $>$ NOT equivalent

Use the following information to answer question 20.

The expression $\left(\frac{(n^3)^4}{n^2}\right)(n^{10} \div n^5 \times n^2)$ can be simplified to the form n^p .

20. The value of p is

- A. 20
- B. 17
- C. 14
- D. 13

Expand

$$\frac{(n \cdot n \cdot n)(n \cdot n \cdot n)(n \cdot n \cdot n)(n \cdot n \cdot n)}{n \cdot n} \times \frac{n \cdot n \cdot n \cdot n \cdot n \cdot n \cdot n \cdot n \cdot n \cdot n}{n \cdot n \cdot n \cdot n \cdot n} \times n \cdot n$$

$n^{12} \times n^7 = n^{17}$ (as there are 17 n left)

$$\left(\frac{n^{12}}{n^2}\right) \left(\frac{n^{10}}{n^5}\right) (n^2)$$

$$(n^{12-2})(n^{10-5})(n^2) = (n^{10})(n^5)(n^2) = n^{17}$$

Use the following information to answer question 21.

Nathan completed a 5 km run on his first day of training for a cross-country race. He increased the length of his next training runs by 1.5 km each time.

21. Which of the following equations could be used to determine the distance (d) that Nathan ran on each training run (r)?

- A. $d = 1.5r$
- B. $d = 5r$
- C. $d = 1.5 + 3.5r$
- D. $d = 3.5 + 1.5r$

5 km \rightarrow Run 1
 6.5 km \rightarrow Run 2
 8 km \rightarrow Run 3

Each run, runs an extra 1.5

So $1.5r$ is part of the equation

B. Use Run 2 = 6.5 km

$6.5 = 5 \times 2$ *Not possible*

A. Use Run 2 = 6.5 km

$d = 1.5(2) \Rightarrow 6.5 \neq 3$ *Not possible*

C. Run 2 = 6.5 km

$6.5 \text{ km} = 1.5 + (3.5)(2)$

$6.5 \neq 1.5 + 7$ *Not possible*

Run 2 = 6.5 km

D. $3.5 + 1.5r = 6.5$

$3.5 + (2)(1.5)$

$3.5 + 3 = 6.5$

21

$6.5 = 6.5$

Yes!

Just in case try Run = 3

$3.5 + (1.5)(3)$

$3.5 + 4.5 = 8$

It checks

Use the following information to answer question 22.

The relationship between two variables is given in the equation $35 + 15n = A$.

22. Which of the following situations could be represented using the equation above?
- A. The price of a caterer for a party is \$35 for each dinner ordered and \$15 for each dessert ordered.
 - B. The bill for framing a painting is \$35 for each square metre of glass required and \$15 for the wooden frame.
 - C. The fee for a computer consultant is \$15 for an administration charge and \$35 for each hour worked.
 - D. The cost of silk screening a design on T-shirts is \$15 for each shirt created and a \$35 design fee.

35 is the constant, which means it is not dependent on variable

Numerical Response

6. The value of x in the equation $\frac{x}{5} + 1 = 26$ is 125.

(Record your answer in the numerical-response section on the answer sheet.)

$$\frac{x}{5} + 1 = 26 \quad \text{means}$$

↓

$$25 + 1 = 26$$

$$\text{so } 25 = \frac{x}{5}$$

or a number divided by 5 is 25

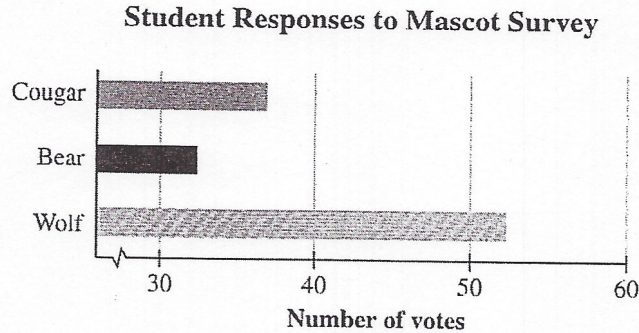
$$\text{or } x = 25 \times 5 = 125$$

check:

$$\frac{125}{5} + 1 = 25 + 1 = 26$$

Use the following information to answer question 23.

The student council of a senior high school surveyed 120 out of 250 Grade 10 students to determine which of three animals should be the school's new mascot. The results of the survey are shown below.



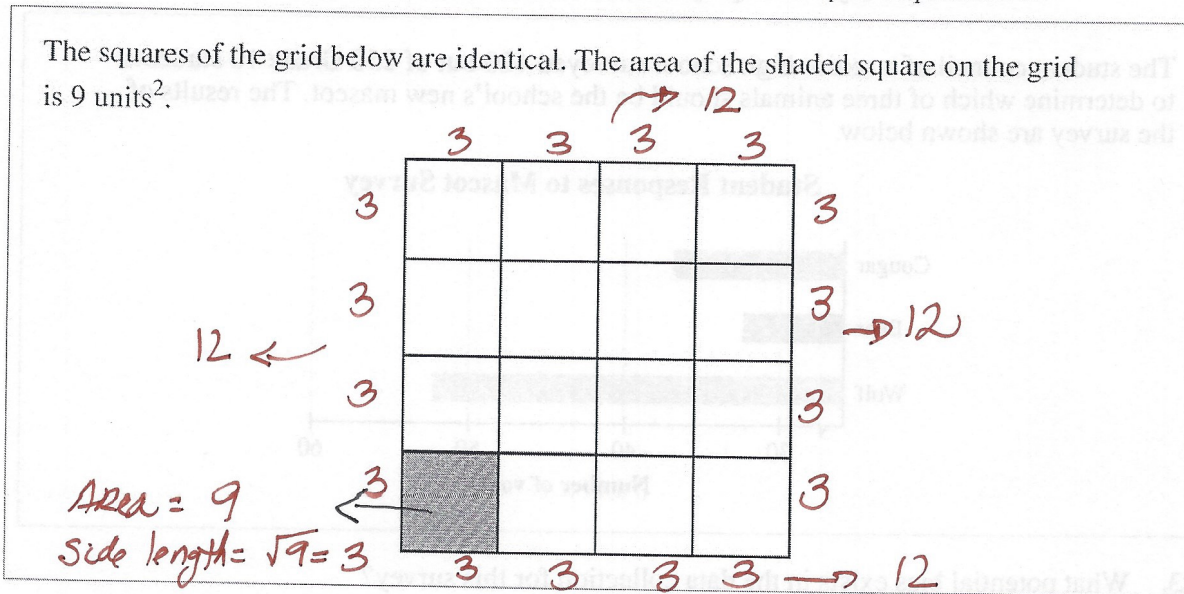
23. What potential bias exists in the data collection for this survey?

- A. The survey question is confusing. → We do not know the question
- B. The survey took too long to complete. → we do not know this for sure
- C. The sample does not represent the population.
- D. The participants' cultural beliefs were not considered. → I'm not sure this is relevant.

• It is a high school, so there are students in grades 10, 11 and 12

• Only grade 10 students are surveyed, so no grade 11 and 12 were given the chance to opine. The decision based on grade 10's survey does not represent the opinion of all students

Use the following information to answer numerical-response question 7.



Numerical Response

7. The perimeter of the grid shown above is 48 units.

(Record your answer in the numerical-response section on the answer sheet.)

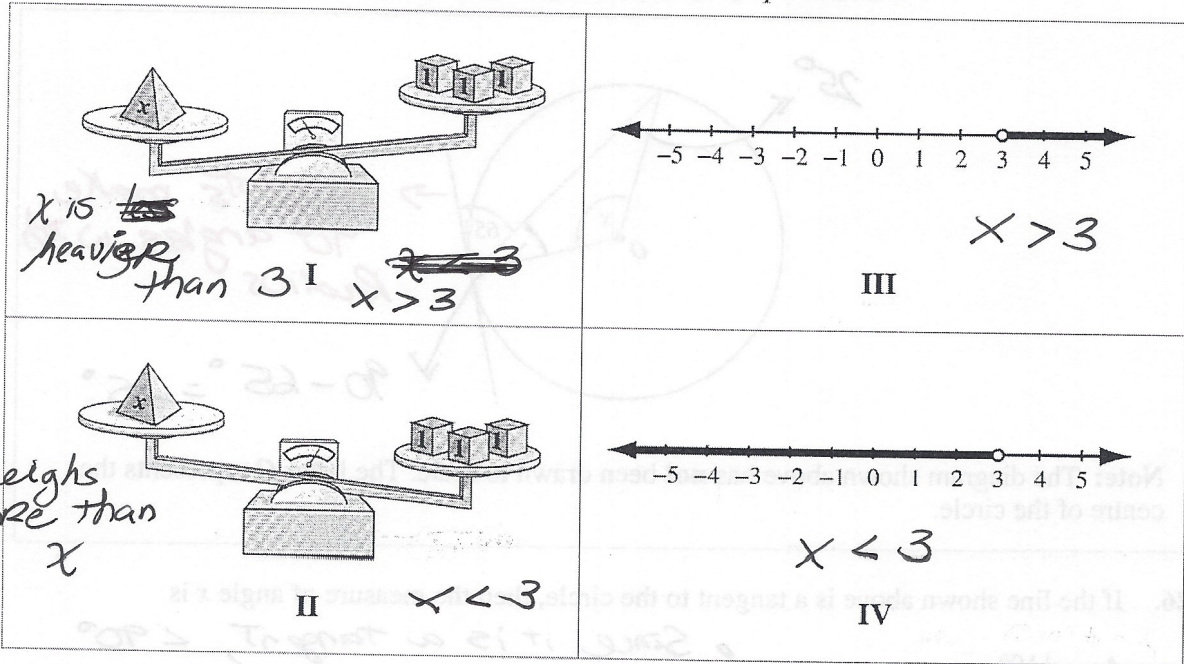
Perimeter → The addition of all sides (outside boundary)

$$\text{Perimeter} = 12 + 12 + 12 + 12 = 48$$

or

$$3 \times 16 = 48$$

Use the following diagrams to answer question 24.



24. The two diagrams shown above that **both** represent the inequality $x > 3$ are numbered

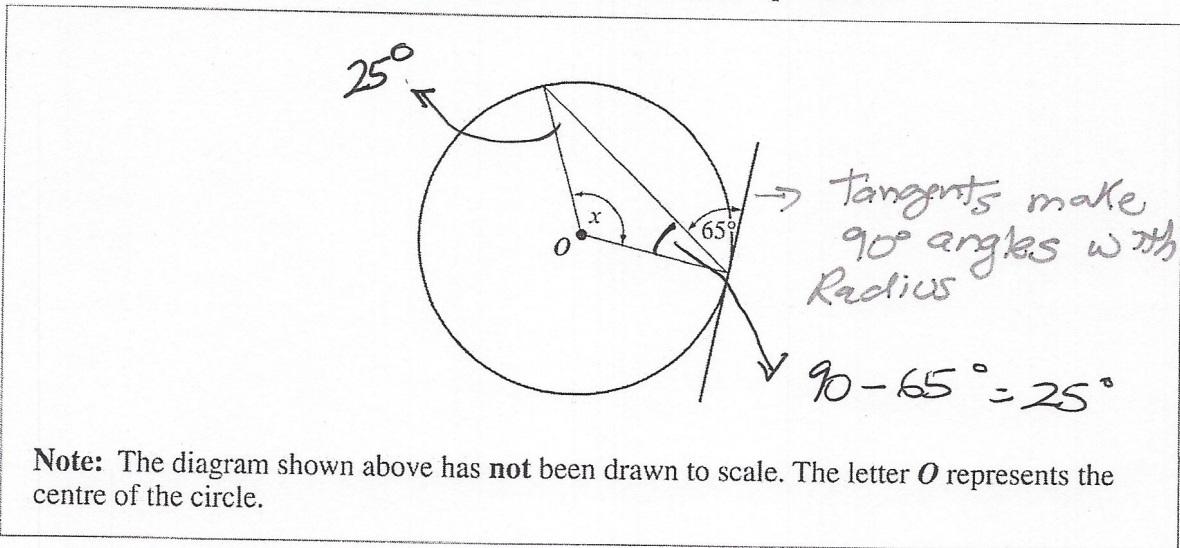
- A. I and III
- B. I and IV
- C. II and III
- D. II and IV

25. Which of the following sets of powers is arranged in order of increasing value from left to right?

- A. $-2^2, -1^2, (-1)^2, (-2)^2$ • $-2^2 = -4$; $-1^2 = -1$
- B. $(-2)^2, (-1)^2, -1^2, -2^2$ • $(-1)^2 = 1$; $(-2)^2 = 4$
- C. $-1^2, (-1)^2, -2^2, (-2)^2$
- D. $(-1)^2, -1^2, -2^2, (-2)^2$ • $-4 < -1 < 1 < 4$

Increasing from left to right
Smallest \rightarrow largest

Use the following information to answer question 26.



Note: The diagram shown above has **not** been drawn to scale. The letter **O** represents the centre of the circle.

26. If the line shown above is a tangent to the circle, then the measure of angle x is

- A. 110°
- B. 115°
- C. 130°
- D. 155°

• Since it is a tangent, $\angle 90^\circ$
 $65^\circ + \angle \text{Triangle} = 90^\circ$
 $\angle \text{Triangle} = 90^\circ - 65^\circ = 25^\circ$
 • Because 2 of the sides are Radii, they equal, thus isosceles triangle has 2 equal sides.
 • then $x = 180 - (25 + 25) = 130^\circ$

Use the following information to answer question 27.

Connie buys a horse for \$750 (including GST). She considers the two payment plans shown below.

Plan 1 Pay \$150 now and \$25 each month
Plan 2 Pay \$200 now and \$55 each month

27. How many **fewer** monthly payments could Connie make if she selects Plan 2?

- A. 10
- B. 14
- C. 20
- D. 24

• Plan 1: $\$750 - \$150 = \$600$
 $\frac{600}{25} = 24$ (It'd take 24 months)
 • Plan 2: $\$750 - \$200 = \$550$
 $\frac{550}{55} = 10$ (It takes 10 months)
 • $24 - 10 = 14$ fewer payments

Use the following information to answer question 28.

The simplifications of two different expressions are shown below.

Expression X

$$\begin{aligned} & (3^2)^3 - 4^4 + 4^2 \times (-5)^2 \\ & = 3^6 - 4^4 + 4^2 \times (-5)^2 \\ & = 729 - 256 + 16 \times 25 \\ & = 729 - 256 + 400 \\ & = 873 \end{aligned}$$

Expression Y

$$\begin{aligned} & 2^6 \div 2^2 + (-5^2) \times 3 \\ & = 2^3 + (-5^2) \times 3 \\ & = 8 + (-25) \times 3 \\ & = 8 + (-75) \\ & = -67 \end{aligned}$$

Mistakes!

$$\frac{2^6}{2^2} = \frac{2 \cdot 2 \cdot 2 \cdot 2 \cdot 2 \cdot 2}{2 \cdot 2}$$

28. Which of the following statements about the simplifications above is true?

- A. The simplifications of both expressions are correct.
- B. The simplifications of both expressions are incorrect.
- C. The simplification of Expression X is correct and the simplification of Expression Y is incorrect.
- D. The simplification of Expression Y is correct and the simplification of Expression X is incorrect.

Numerical Response

8. How many whole numbers could represent the value of x in the inequality statement $\frac{1}{4} < \frac{3}{x} < 0.5$?

Answer: 5 whole numbers

(Record your answer in the numerical-response section on the answer sheet.)

$$0.25 < \frac{3}{x} < 0.5$$

$$x < \frac{3}{0.25}$$

$$x < 12$$

$$\frac{3}{x} < 0.5$$

$$3 < (0.5)x$$

So: x is greater than $\frac{3}{0.5}$
 x is smaller than $6 < x$

6 7 8 9 10 11 12
 5 numbers

Use the following information to answer question 29.

After zero pairs

$$7 \square = -7$$

$$5 \text{ } \text{I} = -5x$$

$$1 \square = -x^2$$

Legend

 = 1	 = x	 = x ²
 = -1	 = -x	 = -x ²

29. Which of the following polynomial expressions could be added to the expression shown above to result in a sum that contains only a constant term?

- A. $x^2 + 5x + 3$
- B. $4x^2 + 8x$
- C. $-x^2 - 5x - 3$
- D. $-4x^2 - 8x$

• Make zero pairs to start
 • After zero pairs, we have
 $-x^2 - 5x - 7$
 • the goal is to end up with just a constant term

OR
 $-x^2 - 5x - 7$ only a term here

to eliminate this,
 $x^2 + 5x$

• the only choice that contains $x^2 + 5x$ is **A**

$$\begin{array}{r} -x^2 - 5x - 7 + \\ x^2 + 5x + 3 \\ \hline -4 \end{array}$$

If you don't want to make 0 pairs:

group "like terms"

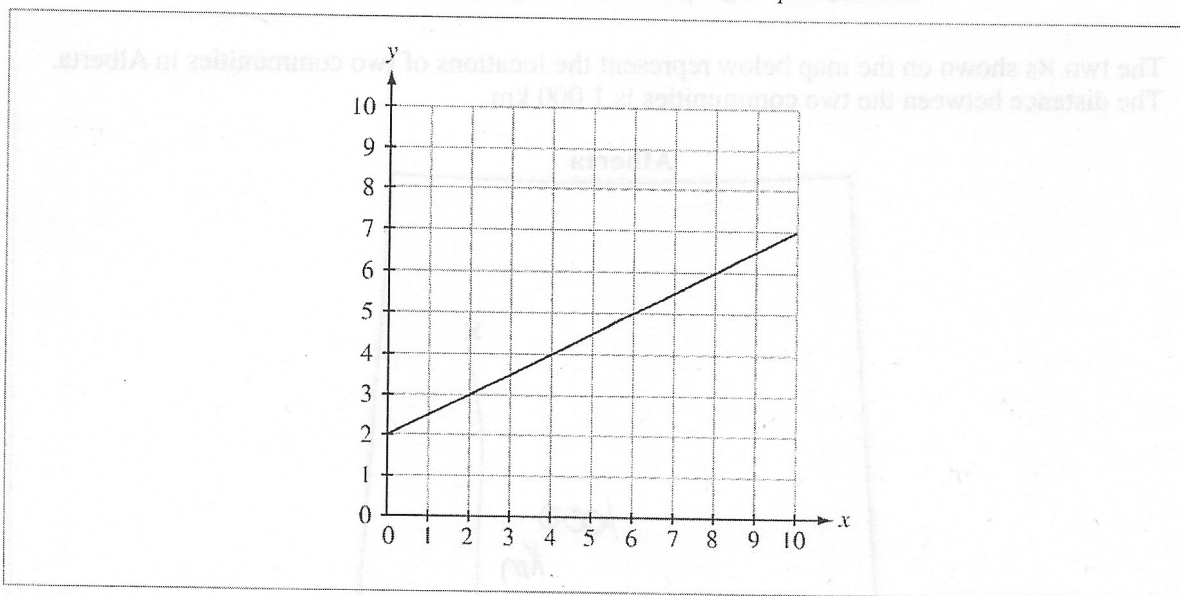
$$x^2 - x^2 + x^2 + x^2 - x^2 - x^2 - x^2 - x^2$$

$$+ x^2 - 1 + x^2 - 1 + 1 - x^2$$

$$4x^2 - 3 - x^2 - x^2 - 2 + 2$$

$$-x^2 - 5x - 7$$

Use the following information to answer question 30.



30. The line created by the relation $y = 5 - x$ will intersect the line shown on the graph above at

- A. (0, 5)
- B. (5, 0)
- C. (2, 3)**
- D. (3, 2)

x	y
0	5
1	4
2	3

31. The value of x in the equation $2(x + 5) - 12 = 50$ is

- A. 24
- B. 26**
- C. 32
- D. 36

$$2(x+5) - 12 = 50$$

check

$$2(26+5) - 12 =$$

$$2(31) - 12 =$$

$$62 - 12 = 50$$

it checks!

a number that, when 12 is taken away, equals 50.

$$62 - 12 = 50$$

$$2(x+5) = 62$$

$$2x + 10 = 62$$

↳ $2x$ has to be 52

↳ a number $\times 2$ is 52

$$\hookrightarrow 26 \times 2 = 52$$

so $x = 26$

another way:

$$2(x+5) - 12 = 50$$

$$2x + 10 - 12 = 50$$

$$2x - 2 = 50$$

$$2x = 50 + 2$$

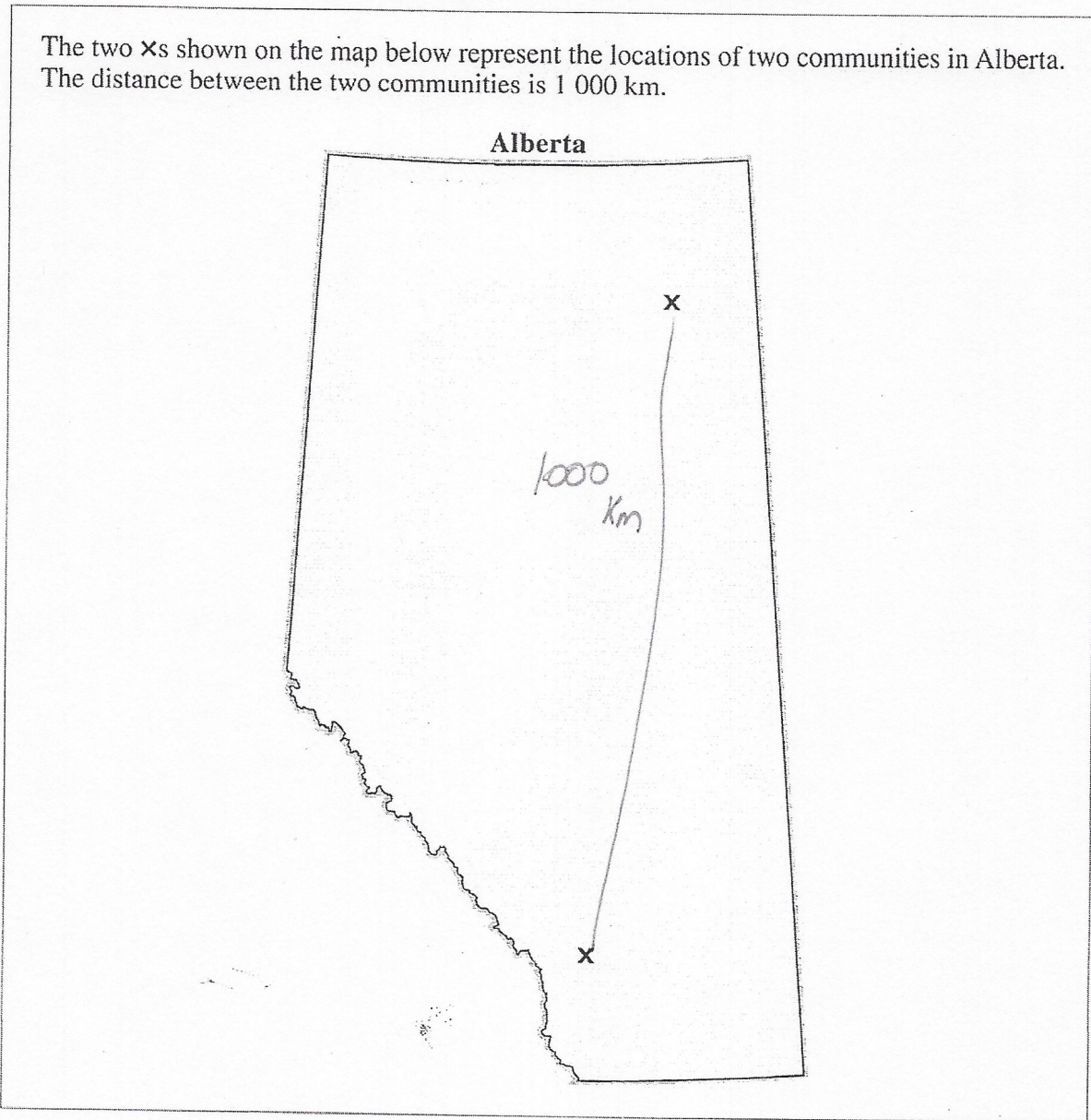
$$2x = 52$$

$$x = \frac{52}{2}$$

$$\boxed{x = 26}$$

Use the following information to answer question 32.

The two x's shown on the map below represent the locations of two communities in Alberta. The distance between the two communities is 1 000 km.



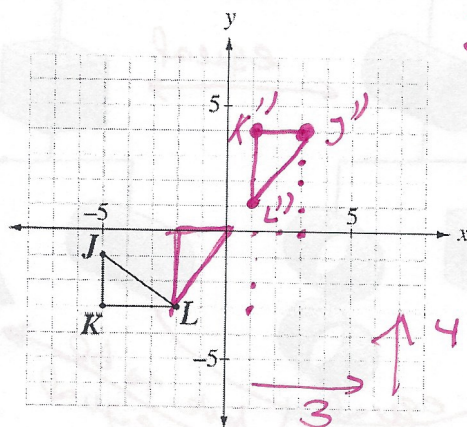
32. Which of the following ratios represents the scale used to create the map?

- A. 1 cm:10 km → this would mean that the distance here is 100 cm ($100 \times 10 = 1000$)
 - B. 1 cm:100 km
 - C. 1 cm:1 000 km → this would mean that the distance between the 2 x's has to be 10 cm ($10 \times 100 = 1000$)
 - D. 1 cm:10 000 km → this seems the most reasonable
- NOT possible

Use the following information to answer question 33.

Triangle JKL , shown below, undergoes the following transformations:

- a 90° clockwise rotation about vertex L
- a translation of 3 units right and 4 units up



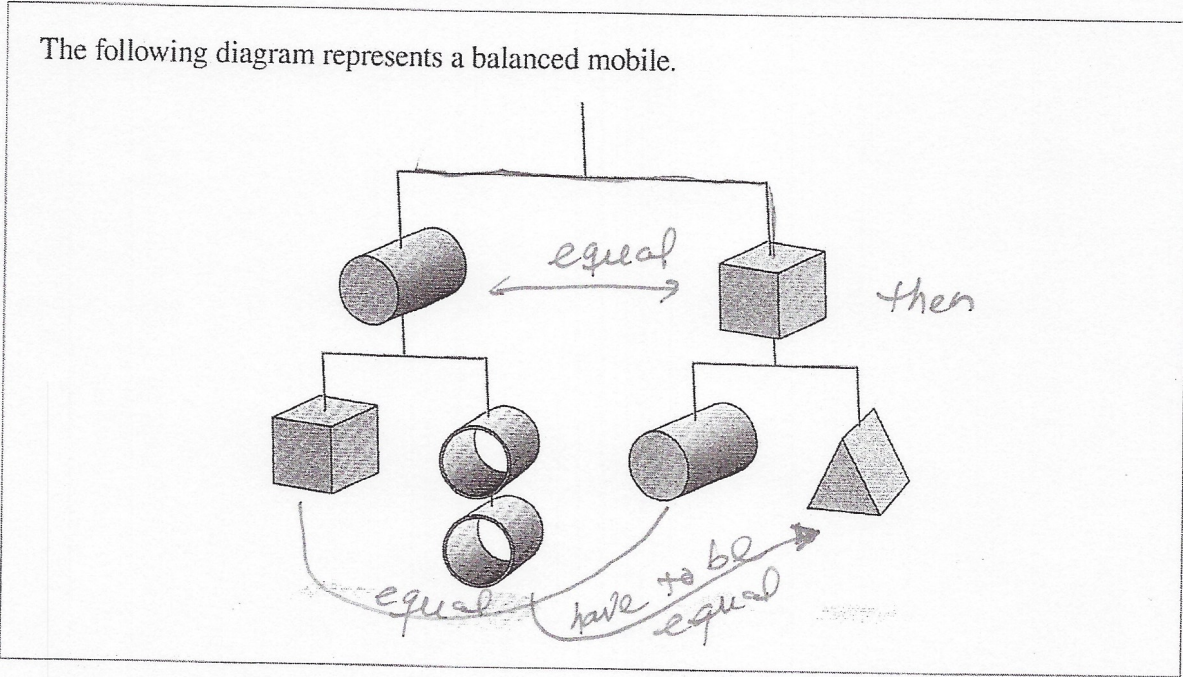
$J'' = (3, 4)$
 $K'' = (1, 4)$
 $L'' = (1, 1)$

33. Which of the following rows represents the ordered pair for each vertex after **both** the transformations described above have been completed?

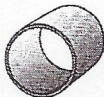
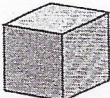
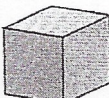
Row	J''	K''	L''
A.	(1, 1)	(1, 4)	(3, 4)
B.	(1, 1)	(1, -2)	(-1, -2)
C.	(4, 3)	(2, 3)	(2, 0)
D.	(3, 4)	(1, 4)	(1, 1)

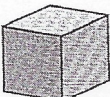


Use the following information to answer question 34.


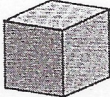
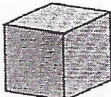
The following diagram represents a balanced mobile.






34. Which of the following equations correctly represents the relationship between some of the objects shown in the diagram above?

A.  =  

B.  =  

C.  =  

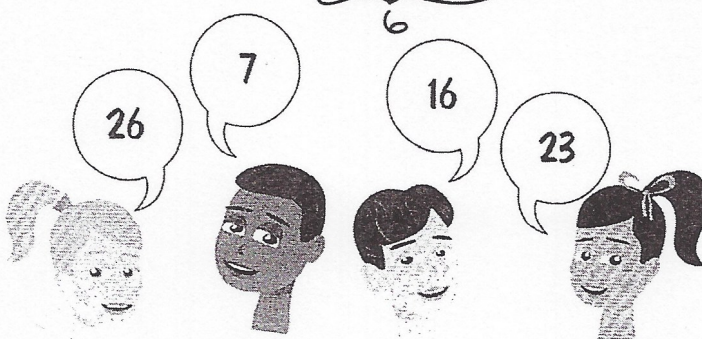
D.  =  

Use the following information to answer question 35.

Each of the four students shown below simplifies the following expression.

$$4 + 3 \times 5 - \underbrace{6^4 \div (4+2)^3}_{6} \times 2$$

Follow
• BEDMAS



Student 1
Student 2
Student 3
Student 4

35. Which student correctly simplified the expression?

- A. Student 1
- B. Student 2
- C. Student 3
- D. Student 4

$$\begin{aligned} & \underline{4 + 15} - 12 \\ & 19 - 12 = 7 \end{aligned}$$

- ① Brackets: $(4+2)^3 = (6)^3$
- ② Exponents: $6^4 / 3 = 6^{4-3} = 6^1 = 6$ (also division)
- ④ Multiplication: $3 \times 5 = 15$
- ⑤ Addition: $6 \times 2 = 12$
- ⑥ Sub.

Numerical Response

9. The quotient of $(-12x^2 - 9x) \div \blacksquare x$ is $-4x - 3$. What is the value of \blacksquare ?

Answer: 3

(Record your answer in the numerical-response section on the answer sheet.)

Division

$$\frac{-12x^2 - 9x}{\blacksquare x} = -4x - 3$$

$\blacksquare x \rightarrow -12/3 = -4$ $x^2/x = x$
 and
 $-9/3 = -3$ $x/x = 1$

• the only possible value is 3.

Use the following information to answer question 36.

	X: -0.054	Biggest
	Y: $-\frac{11}{3} = -3.\overline{6}$	
	Z: $-\frac{15}{4} = -3.75$	Smallest

36. Which of the following inequalities represents the rational numbers shown above?

- A. $Y < Z < X$
- B. $Y < X < Z$
- C. $Z < X < Y$
- D. $Z < Y < X$

• negative numbers are bigger the closer to 0 they are

SO $Z < Y < X$

Use the following information to answer question 37.

Emily's cellphone plan charges her \$0.05 per text message, \$0.06 per minute of voice usage and a \$5.00 base fee each month.

37. What is Emily's cellphone bill if she sent 33 text messages and talked for 47 minutes in one month?

- A. \$5.11
- B. \$6.65
- C. \$7.82
- D. \$9.47

monthly

$$\text{Bill} = 0.05t + 0.06m + \$5$$

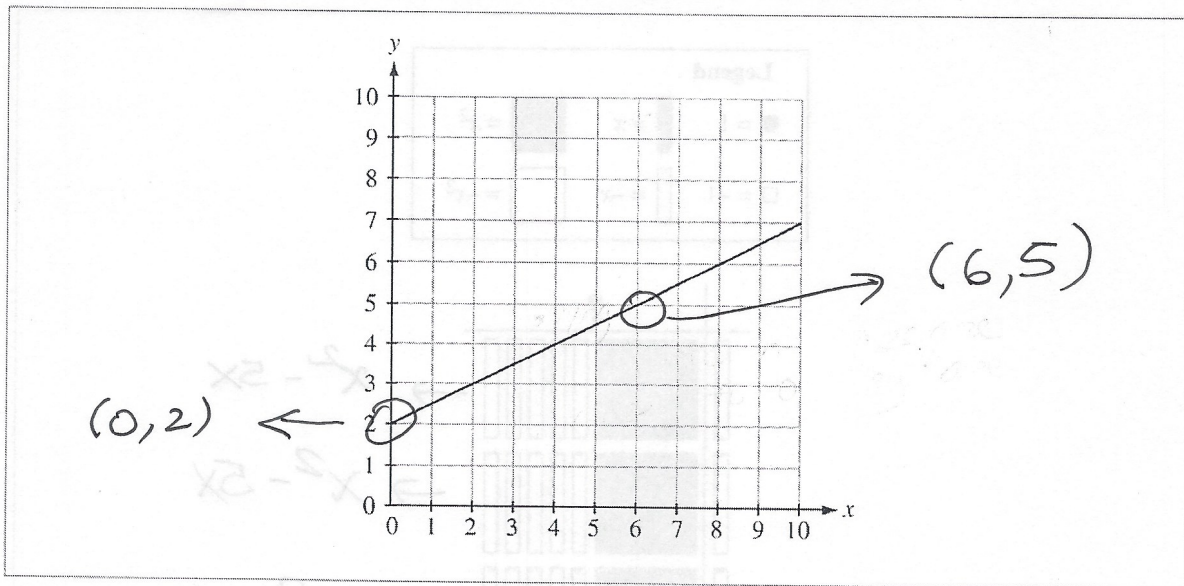
↓
33

↓
47

$$= 0.05(33) + 0.06(47) + 5$$

$$1.65 + 2.82 + 5 = \$9.47$$

Use the following information to answer question 38.



38. The equation representing the linear relation on the graph shown above is

- A. $y = 0.5x + 2$
- B. $y = 0.5x - 2$
- C. $y = 2x + 4$
- D. $y = 2x - 4$

Use the graph, pick a couple of coordinates or "ordered pairs"

A match!

Try (0, 2)

A $\rightarrow y = 0.5(0) + 2 = 2$ (0, 2) \rightarrow

B $\rightarrow y = 0.5(0) - 2 = -2$ (0, -2)

C $\rightarrow y = 2(0) + 4 = 4$ (0, 4)

D $\rightarrow y = 2(0) - 4 = -4$ (0, -4)

try (6, 5)

A $\rightarrow y = 0.5(6) + 2 = 3 + 2 = 5$ (6, 5) \rightarrow A match!

B $\rightarrow y = 0.5(6) - 2 = 3 - 2 = 1$ (6, 1)

C $\rightarrow y = 2(6) + 4 = 12 + 4 = 16$ (6, 16)

D $\rightarrow y = 2(6) - 4 = 12 - 4 = 8$ (6, 8)

Use the following information to answer question 40.

Ethan conducts a survey to determine the demand for an outdoor skating rink in his community.

40. Ethan can best minimize the bias in his survey by collecting data from people who
- A. are different ages *(a more varied, general point of view)*
 - B. live in different cities \rightarrow Biased! *(Everyone probably wants their city to get the rink)*
 - C. participate in figure skating \rightarrow Biased! *(they want to skate)*
 - D. visit the rink at the same time each day \rightarrow Biased! *(part of their routine is to go at the same time)*

Use the following information to answer numerical-response question 10.

Patricia wants to buy a new pair of ice skates that cost \$250 including GST. She already has \$86 she plans to use towards this purchase. She earns \$10.25/hour at her part-time job.

Numerical Response

10. What is the minimum number of hours that she must work to save enough money to purchase the pair of ice skates?

Answer: 16 hours

(Record your answer in the numerical-response section on the answer sheet.)

Price = 250 • 86 to start
• 10.25 per hour
• how many hours?

$$250 = 86 + 10.25h$$

$$250 - 86 = 10.25h$$

$$164 = 10.25h$$

$$h = \frac{164}{10.25} = 16.00$$