

PART A

This part of the examination consists of Questions 1 to 6.

Each question in this part of the examination is worth 4 marks.

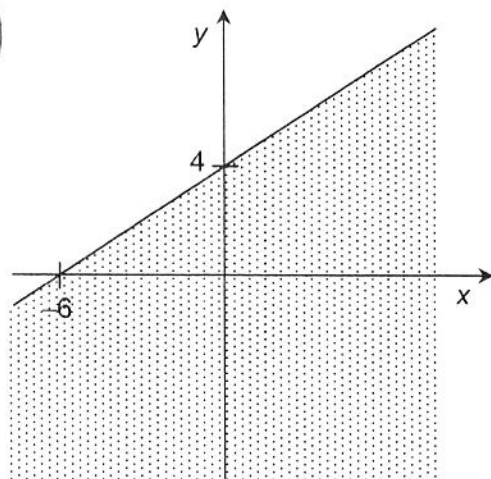
On page 5 of your *Student Booklet*, fill in the box under the letter that corresponds to your answer.

1. Which of the following half-planes represents the solution set of the inequality $2x \geq 3y - 12$?

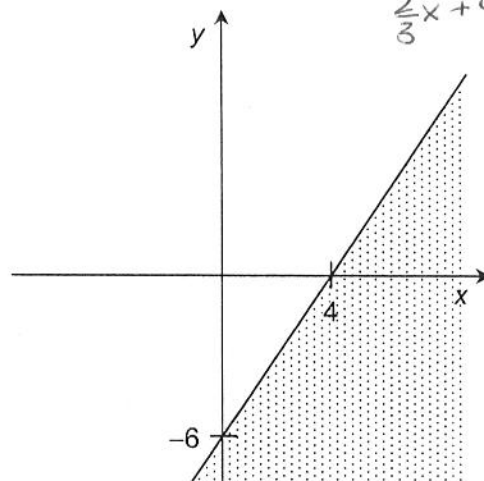
$$\frac{2x+12}{3} \geq \frac{3y}{3}$$

$$\frac{2}{3}x + 4 \geq y$$

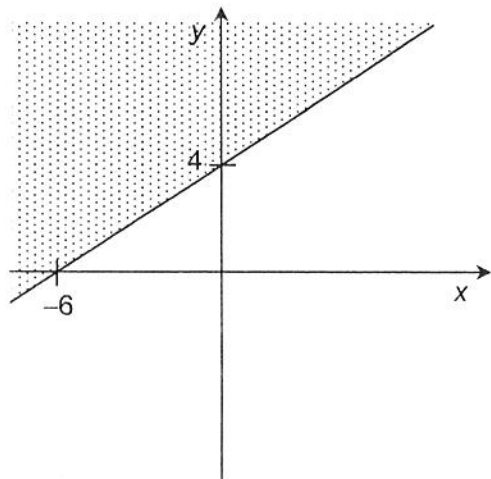
A)



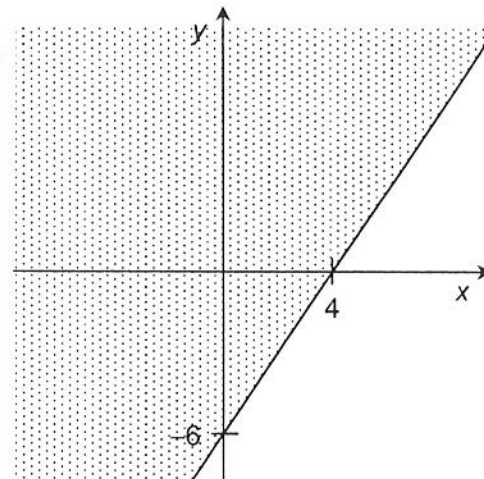
~~C)~~



B)



~~D)~~



$$\frac{10y}{10} = \frac{-8x + 5}{10}$$

2. The equation of line l is $8x + 10y - 5 = 0$.

$$y = -\frac{4}{5}x + 2$$

Find slope

Which of the following equations represents a line parallel to line l ?

A) $y = -\frac{5}{4}x$

~~C) $y = \frac{4}{5}x$~~

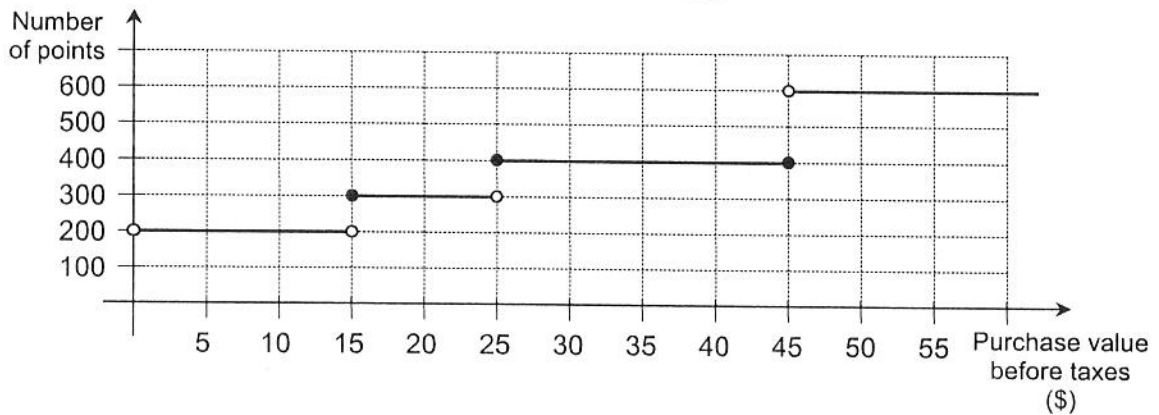
B) $y = -\frac{4}{5}x$

~~D) $y = \frac{5}{4}x$~~

3. Customers earn points for every purchase they make at a music store. When they have accumulated enough points, they get a gift card.

The function represented below shows how to determine the number of points customers earn according to the value of their purchase, before taxes.

NUMBER OF POINTS EARNED ACCORDING TO PURCHASE VALUE BEFORE TAXES



In May, Rose made three purchases at the music store: one on May 8, one on May 15 and one on May 25. Before taxes, the values of her purchases were \$9.50, \$22 and \$45 respectively.

How many points did Rose earn at the music store in May?

A) 600

C) 1 000

B) 900

D) 1 100

Don't do this:
 $9.50 + 22 + 45 = 76.5$

You need to do them separately

$9.50 = 200$
 $22 = 300$

$45 = 400$

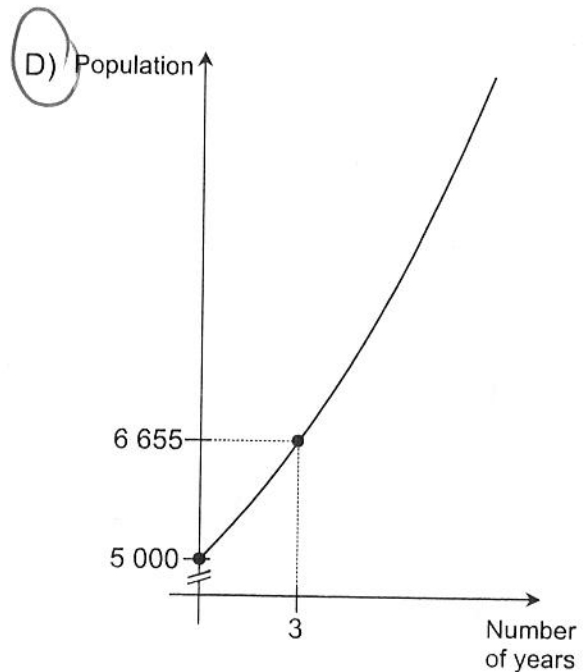
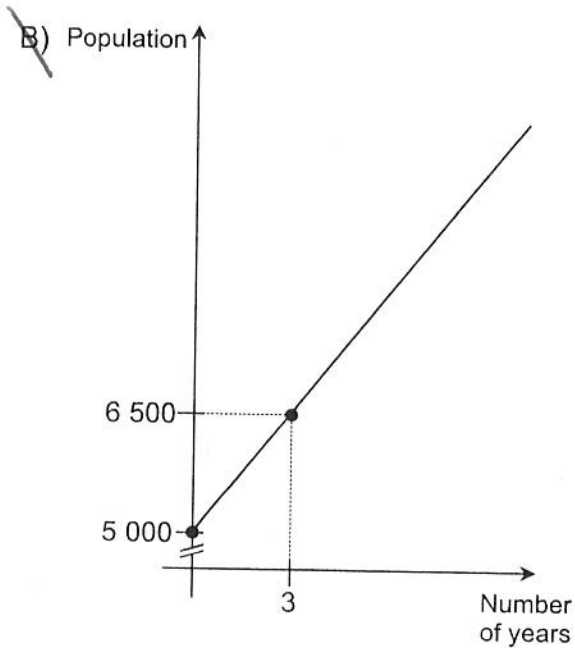
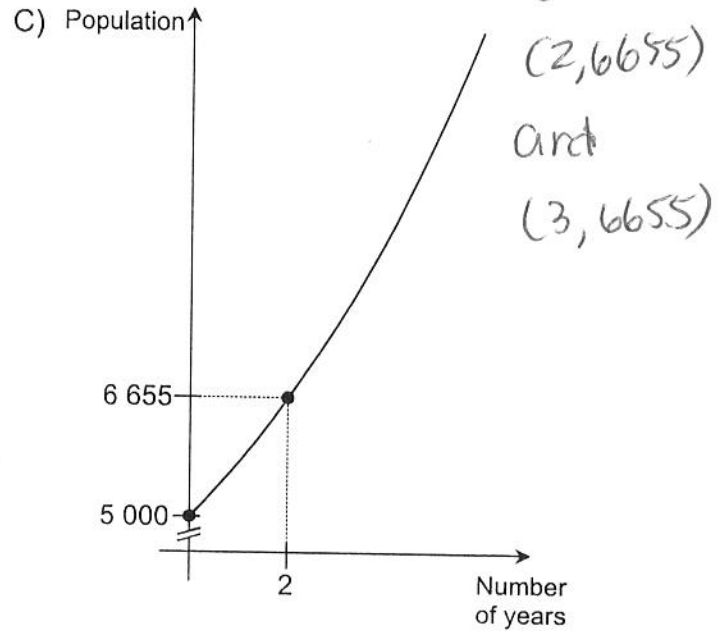
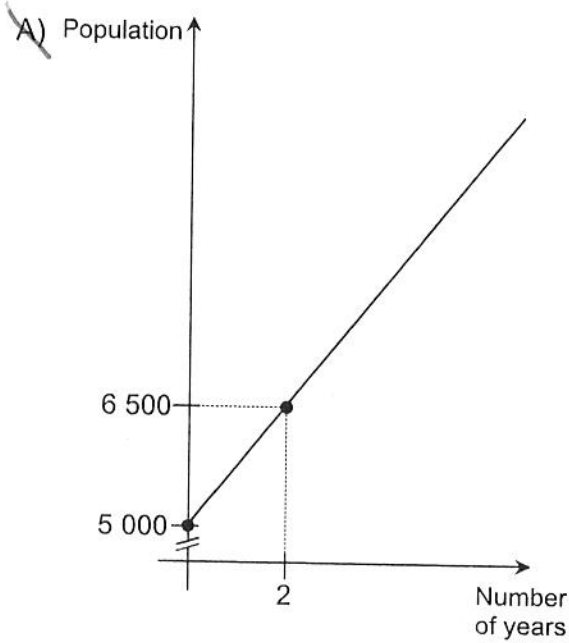
$200 + 300 + 400 = 900$

initial value exponential

4. In 2011, a town had a population of 5 000. It is estimated that each year, the population will increase by 10% relative to the previous year.

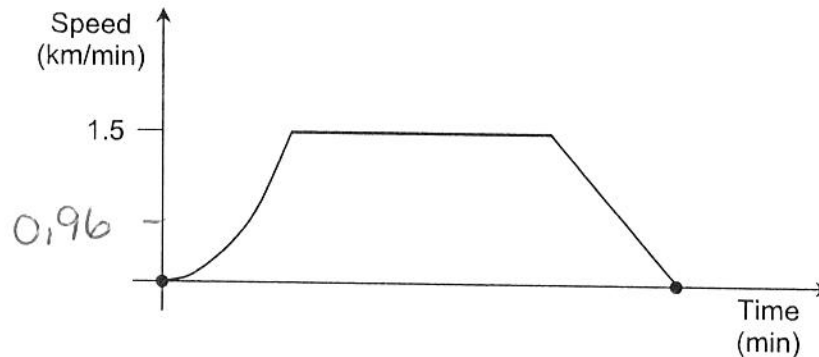
$$y = 5000(1.1)^x$$

Which graph below represents the population this town will have in relation to the number of years elapsed since 2011?



5. A car set off, accelerated and then travelled at a speed of 1.5 km/min for a few minutes. It then slowed down before coming to a complete stop.

SPEED OF THE CAR ACCORDING TO THE TIME ELAPSED FROM THE MOMENT IT SET OFF



Function f described below represents the speed of the car according to the time elapsed from the moment it set off.

$$f(x) = \begin{cases} 0.06x^2 & \text{if } 0 \leq x \leq 5 \\ 1.5 & \text{if } 5 \leq x \leq 15 \\ -0.3x + 6 & \text{if } 15 \leq x \leq 20 \end{cases}$$

where x : time elapsed, in minutes, from the moment the car set off
 $f(x)$: speed of the car in km/min

How much time elapsed between the two moments when the car was travelling at a speed of 0.96 km/min? *-subtract*
This is y value.

A) 4 minutes

C) 12.8 minutes

B) 12 minutes

D) 16.8 minutes

happens in 1st piece and 3rd piece

$$0.96 = 0.06x^2$$

$$\sqrt{16} = \sqrt{x^2}$$

$$4 = x$$

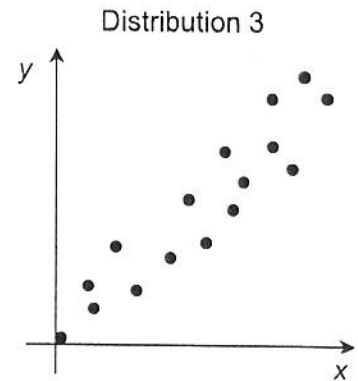
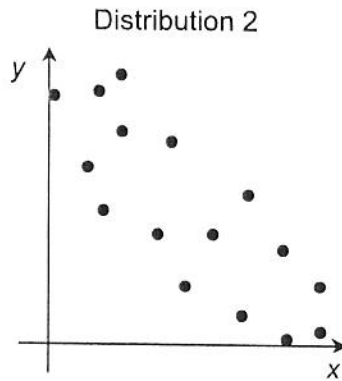
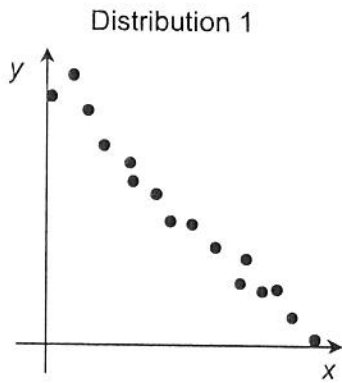
$$0.96 = -0.3x + 6$$

$$16.8 = x$$

$$16.8 - 4$$

$$12.8$$

6. The following scatter plots represent three two-variable distributions.



Which of the following presents these distributions, in order, from the weakest to the strongest linear correlation?

A) 1, 2, 3

B) 1, 3, 2

C) 2, 1, 3

(D) 2, 3, 1

2, 3, 1

PART B

This part of the examination consists of Questions 7 to 10.

Each question in this part of the examination is worth 4 marks.

Write each of your answers in the space provided on page 5 of your *Student Booklet*.

7. The data below indicates the monthly rent, in dollars, of 287 families living in the same city.

600, ..., 770, 775, 775, 780,	800, ... 1120, 1125
181 data values	106 data values

What percentile is associated with a monthly rent of \$775?

$$\left(\frac{178 + \frac{2}{2}}{287} \right) \times 100 = 62.3 \rightarrow$$

63rd percentile

8. A bag contains 140 marbles that are either red or green.

If a marble is drawn at random from the bag, the odds that the marble will be red are 3 to 7.

3:7 ∴ $\frac{3}{10}$ are red

$\frac{3}{10}$ of 140
= 42 red

How many green marbles are in the bag?

98 green

9. The sides of a triangle measure 17 cm, 25 cm and 28 cm respectively.

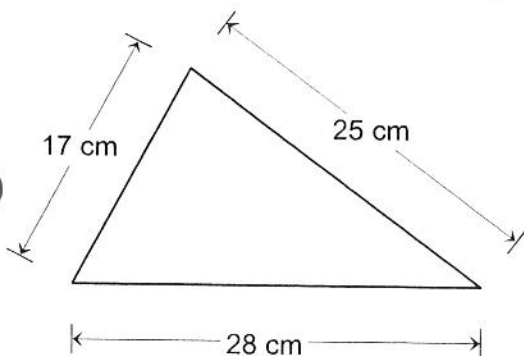
heron's formula

$P = 35$

$A = \sqrt{35(35-17)(35-25)(35-28)}$

$= \sqrt{35(18)(10)(7)}$

$= \sqrt{44100} =$



What is the area of this triangle?

210 cm²

10. Triangle STU shown on the right is right-angled at T.

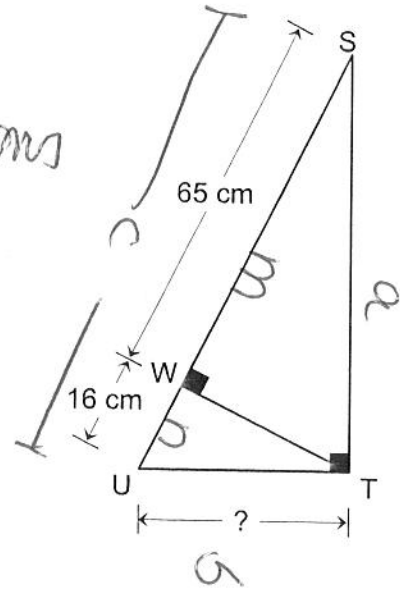
In addition:

$$\overline{TW} \perp \overline{SU}$$

$$m \overline{SW} = 65 \text{ cm}$$

$$m \overline{WU} = 16 \text{ cm}$$

metric relations



What is the length of segment UT?

$$b^2 = nc$$

$$b^2 = 16(81)$$

$$\sqrt{b^2} = \sqrt{1296}$$

$$b = 36$$

36 cm

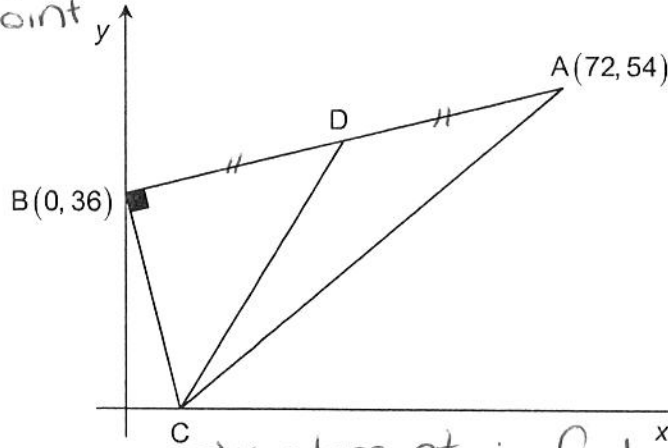
11. A LINE SEGMENT

In the Cartesian plane below:

- triangle ABC is right-angled at B
- point C is located on the x-axis
- point D is on line segment BA

$m\overline{BD} = m\overline{DA}$

D = midpoint



→ x intercept ∴ find equation !!

lines in cartesian plane = analytic geometry

To the nearest tenth, what is the length of line segment CD?

①

$$\underline{D}: \quad x_M = \frac{0+72}{2} = 36$$

$$y_M = \frac{36+54}{2} = 45$$

$$(36, 45)$$

$$y_M = \frac{36+54}{2} = 45$$

③ $d(B,C) =$

$$\sqrt{(36-9)^2 + (45-0)^2}$$

$$= \sqrt{(27)^2 + (45)^2}$$

$$= \sqrt{2754}$$

$$= 52.49$$

$$\approx \boxed{52.5 \text{ units}}$$

②

$\overline{AB} \perp \overline{BC}$

$\overline{AB}: \quad y = ax + b$

$$a = \frac{54-36}{72-0}$$

$$= \frac{18}{72}$$

$$= \frac{1}{4}$$

∴ slope of $\overline{BC} = -4$

$$y = -4x + b$$

$b = 36$ because B is initial value

$$y = -4x + 36$$

xint → let $y = 0$

$$0 = -4x + 36$$

$$4x = 36$$

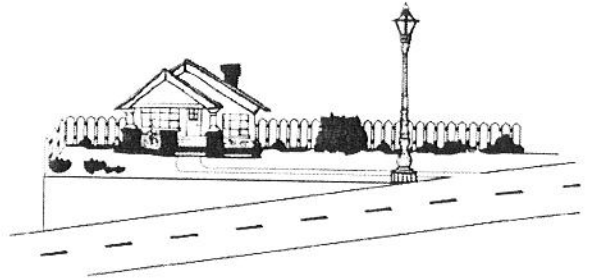
$$x = 9$$

$C(9,0)$

12. THE STREETLIGHT

Tom's street is on an incline.

Tom would like to know the height of the streetlight on the front of his property.

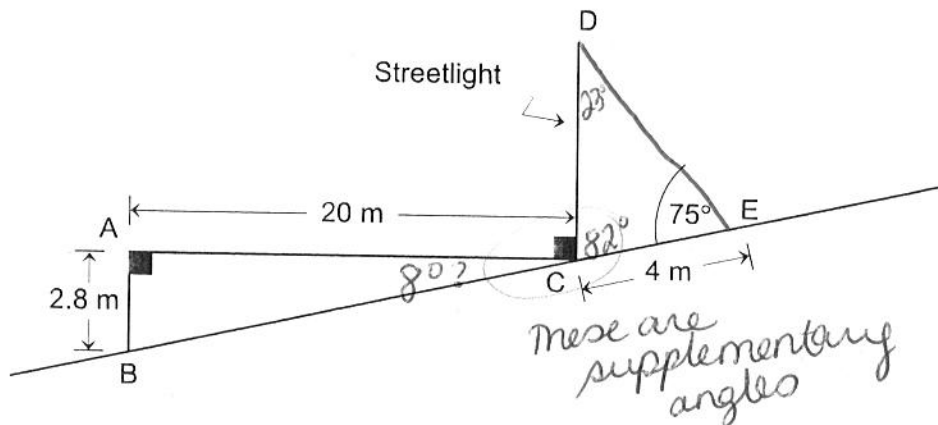


From the streetlight, Tom walks up his street for a distance of 4 m. From where he stops, the measure of the angle formed by the street and his line of vision relative to the top of the streetlight is 75° .

The diagram below shows a front view of Tom's property, the street and the streetlight. Various measurements are shown in this diagram.

In this diagram:

- line BE represents the street
- right triangle BAC represents the front of the property
- line segment CD represents the streetlight



To the nearest tenth of a metre, what is the height of the streetlight?

Angle C: $\tan C = \frac{2.8}{20}$

$$C = \tan^{-1}\left(\frac{2.8}{20}\right)$$

$$= 7.97^\circ$$

$$\approx 8^\circ$$

$$\therefore 180 - 90 - 8 = 82^\circ$$

$$\therefore 180 - 75 - 82 = 23^\circ$$

Height of streetlight:

$$\frac{4}{\sin 23} = \frac{x}{\sin 75}$$

$$\frac{x \sin 23}{\sin 23} = \frac{4 \sin 75}{\sin 23}$$

$$x = 9.89$$

$$\approx 9.9 \text{ m}$$

13. VIVIAN'S BIRTHDAY DINNER

systems!

Last Sunday, Gerald treated his whole family to dinner at a restaurant to celebrate his mother Vivian's 90th birthday. Family members were sitting at three different tables.

Each family member could choose either the Asian meal or the Mediterranean meal.

After dinner, the server gave the following three bills to Gerald. The taxes are included in the totals indicated.

<p>Bill for table 1</p> <p><u>6</u> Asian meals</p> <p><u>2</u> Mediterranean meals</p> <p>Total: \$173</p>

<p>Bill for table 2</p> <p><u>4</u> Asian meals</p> <p><u>3</u> Mediterranean meals</p> <p>Total: \$159.50</p>
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<p>Bill for table 3</p> <p><u>?</u> Asian meals</p> <p><u>5</u> Mediterranean meals</p> <p>Total: \$212.50</p>
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How many people sitting at table 3 chose the Asian meal?

$x =$ cost of Asian meal

$y =$ " " Med " "

$(20, 26.5)$

$$(6x + 2y = 173) \cdot -4$$

$$(4x + 3y = 159.50) \cdot 6$$

$$-24x - 8y = -692$$

$$24x + 18y = 957$$

$$20(x) + 26.50(5) = 212.5$$

$$20x + 132.5 = 212.5$$

$$20x = 80$$

$$x = 4$$

$$10y = 26.5$$

$$y = 26.50$$

$$6x + 2(26.50) = 173$$

$$6x + 53 = 173$$

$$6x = 120$$

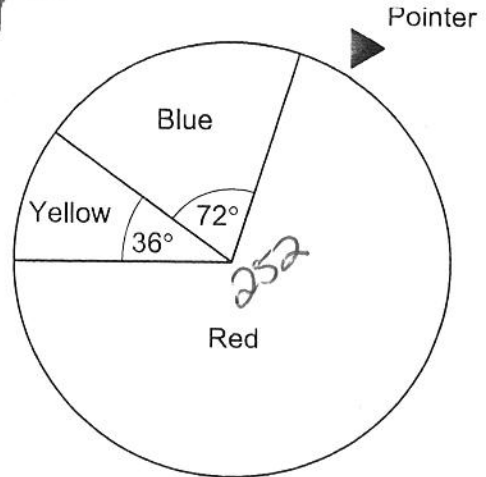
They bought
4 Asian meals

14. WHEEL OF FORTUNE

math. expectation

A wheel of fortune is divided into three circular sectors: one blue, one yellow and one red.

The central angle of the yellow sector measures 36° . The central angle of the blue sector measures 72° .



A game involves spinning the wheel after placing a \$10 bet. The sector at which the pointer will be pointing when the wheels stops turning is determined by chance.

The three possible outcomes in this game are as follows:

- If the pointer is pointing at the yellow sector, players will receive \$30.
- If the pointer is pointing at the red sector, players will receive nothing.
- If the pointer is pointing at the blue sector, players will receive a certain amount of money.

This game is fair.

How much money will players receive if the pointer is pointing at the blue sector?

$$0 = \frac{36}{360} (20) + \frac{252}{360} (-10) + \frac{72}{360} (x - 10)$$

$$0 = 720 - 2520 + 72x - 720$$

$$0 = -2520 + 72x$$

$$2520 = 72x$$

$$35 = x$$

You will win \$35.

15. TWO NEW DANCERS

A dance troupe initially consisted of 4 dancers aged 20, 22, 26 and 28.

The mean age of these 4 dancers was 24.

The mean deviation of their ages was 3 years.



After a show to promote the troupe, 2 new dancers joined the group.

Nick points out that the mean age of the 6 dancers in the troupe is still 24.



Nick draws the following conclusion:

Since the mean age has remained the same and the number of dancers has increased, the mean deviation of the ages has decreased.

Do you think Nick's conclusion is true or false? Explain your answer.

$$\bar{x} = 24$$

$$\frac{x+y+20+22+26+28}{6} = 24$$

$$\frac{x+y+96}{6} = 24$$

$$x+y+96 = 144$$

$$x+y = 48$$

2 ages need to add up to 48 !!

Guess + check

24 and 24

MD = 2 decrease

23 and 25

MD = $2.\bar{3}$ decrease

20 and 28

MD = $3.\bar{3}$ increase

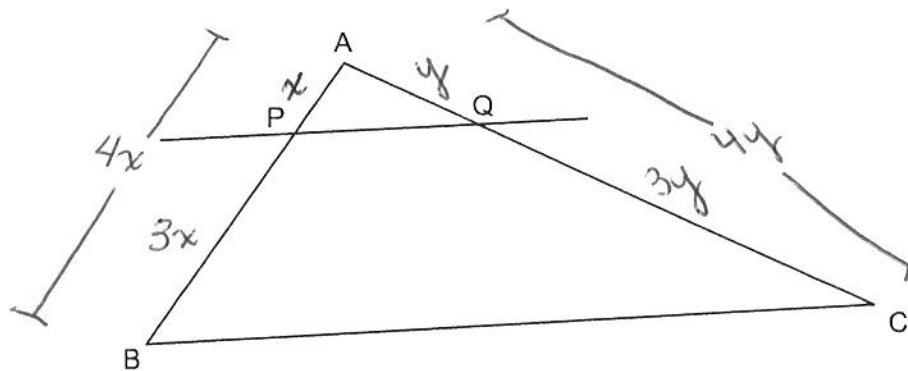
You need to find 1 example to prove it's false !!

16. A SEGMENT IN A TRIANGLE

Line PQ intersects two sides of triangle ABC : side AB at P and side AC at Q .

In addition:

- $m\overline{AB} = 4 \times m\overline{AP}$
- $m\overline{QC} = 3 \times m\overline{AQ}$



Prove that $m\overline{BC} = 4 \times m\overline{PQ}$.

$$\text{scale factor} = \frac{1}{4}$$

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

$\therefore \triangle APQ \sim \triangle ABC$ by SAS
because $A = \text{common angle}$

