

SEC 4 REVIEW MATERIAL Sept to Feb

Linear Equations, Functions, Systems, Similarity, Congruency

- 1 Match each relation with its corresponding table of values.

RELATIONS

TABLE OF VALUES

- 1 A long distance call costs a certain amount per minute. Which table of values corresponds to the relation between the length of the long distance call and its cost?

A)

x	0	5	10	20
y	1000	1610.5	2593.7	6727.5
		1	4	0

- 2 A term deposit at a bank yields 10% interest per year. Which table of values corresponds to the relation between the term of the deposit and its value?

B)

x	4	5	10	20
y	25	20	10	5

- 3 A group of friends split the cost of renting a room evenly. Which table of values corresponds to the relation between the amount each person must pay and the number of people in the group?

C)

x	5	10,4	15,9	20
y	78.54	339.79	794.23	1256.6
				4

D)

x	1	1,5	4	6
y	0.75	0.75	3	4.50

- 2 A group is organizing a curling competition. Rink rental expenses will be divided evenly among the participating teams. The curling rink costs \$800 to rent.

The organizers expect a maximum of 40 teams.

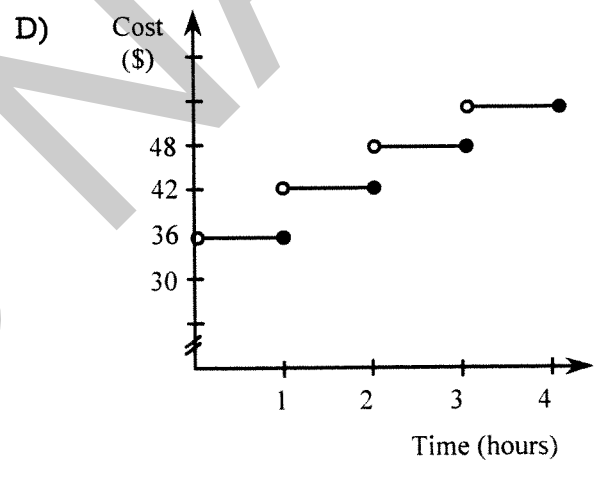
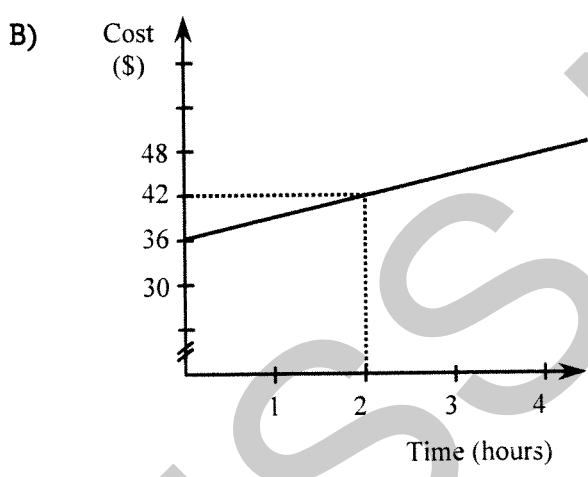
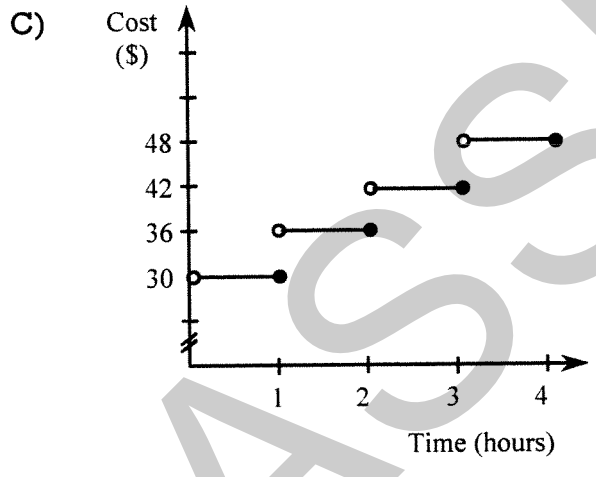
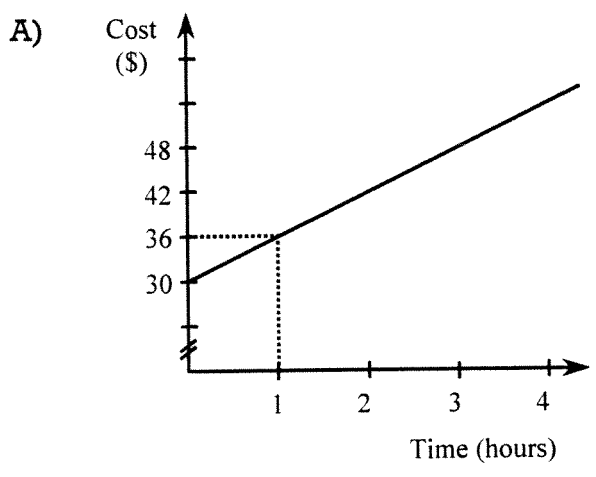
Complete the table below by determining the cost for each team as the number of participating teams increases.

Number of teams	5	10	16	20	25	40
Rental cost per team						

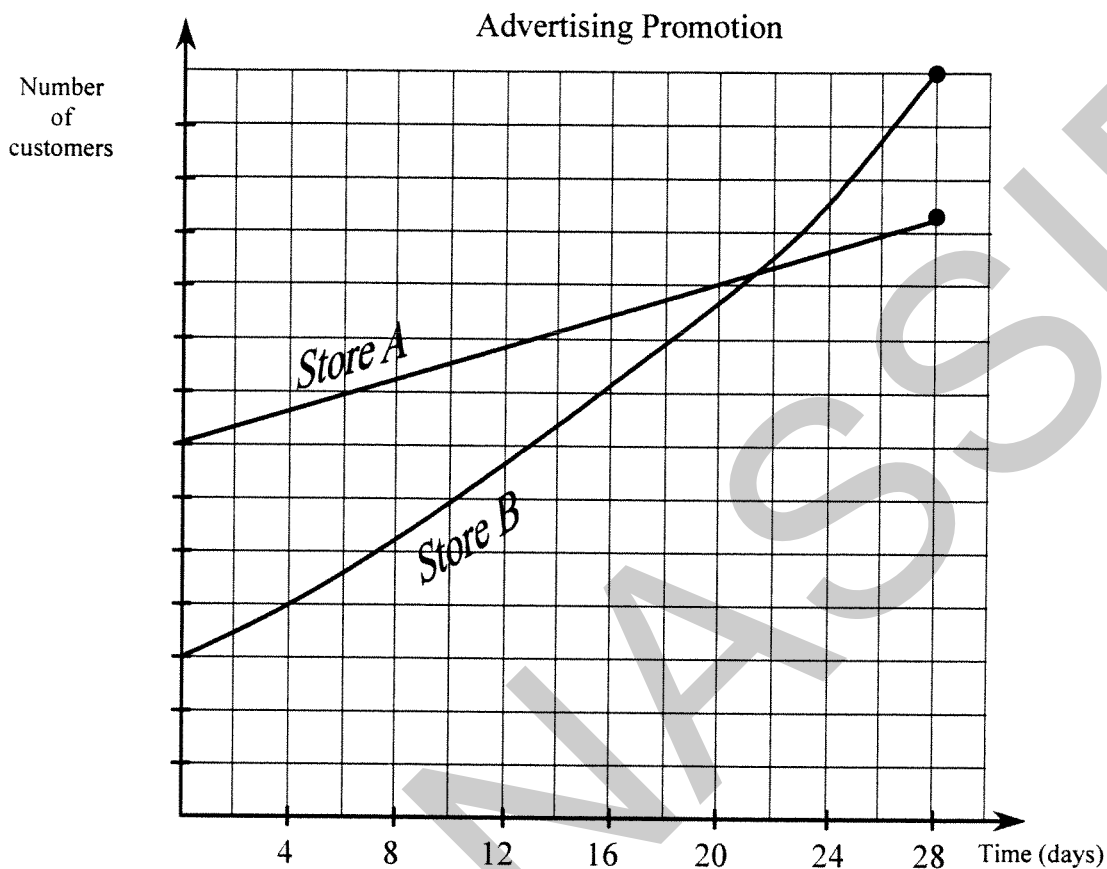
3 "HIRE A STUDENT" is a summer job program for high school students. They paint and do small home repairs for customers.

Customers are charged \$30 for the first hour or part thereof and \$6 for each additional hour or part thereof.

Which of the following graphs represents this situation?



- 4 Two competing sport stores started a 28-day advertising promotion to attract new customers. The following graph shows the relationship between the number of customers who have visited each store since the promotion began.



Which of the following statements are TRUE?

- 1) Halfway through the promotion, Store A had fewer customers than Store B.
- 2) By the end of the promotion, more customers had visited Store B than Store A.
- 3) The two stores never had the same number of customers.
- 4) The difference between the number of customers who had visited the two stores at the beginning of the promotion was greater than the difference at the end.

A) 1 and 2 only

C) 2 and 4 only

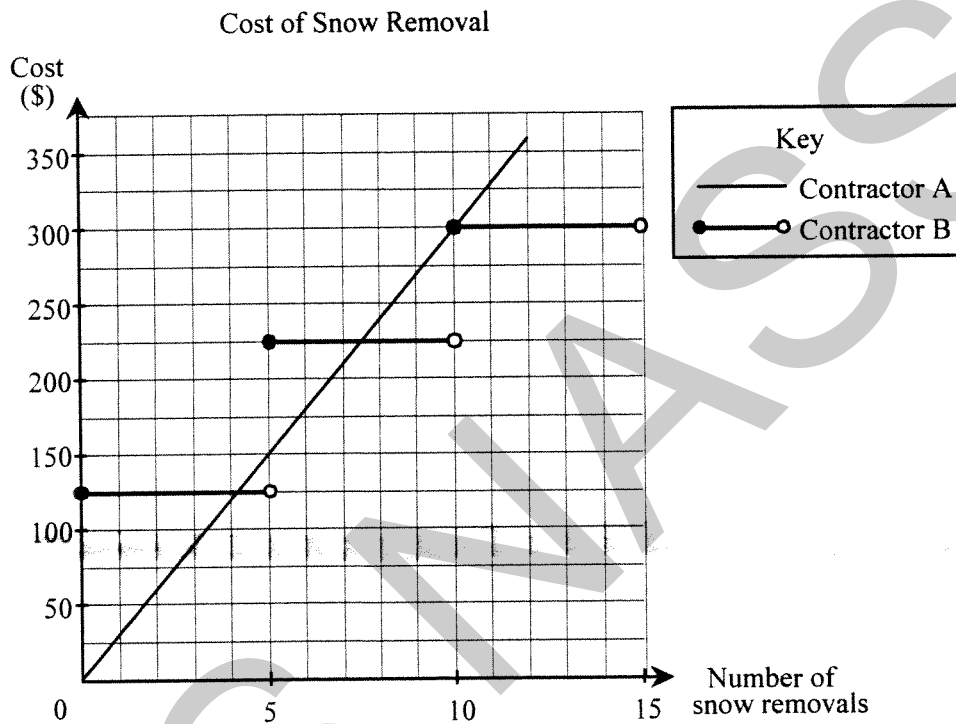
B) 1 and 3 only

D) 2, 3 and 4 only

- 5 Upon exposure to the sun, a 10-kg block of ice loses 30% of its mass for each minute that elapses.

Draw the graph showing the variation of the mass of the block of ice for the first five minutes that it exposed to the sun.

- 6 After comparing the cost of snow removal with two contractors, Mr. Kelly constructed the graph below.



In analyzing the graph, he made the following conclusions:

- 1- For 5 snow removals, contractor B charges less than contractor A.
- 2- For 5 snow removals, the difference in snow-removal costs between contractor A and contractor B is \$75.
- 3- For 10 snow removals, both contractors charge the same amount.

Which of Mr. Kelly's conclusions are TRUE?

- A) 1 and 2 only C) 2 and 3 only
B) 1 and 3 only D) 1, 2 and 3

- 7 A culture of 20 bacteria quadruples its population every hour according to the relation $y = 20(4)^x$.

Which of the tables below represents this relation?

A)

x	y
0	20
0.5	40
1.5	120
2	160

C)

x	y
0	0
1	80
2	320
3	1280

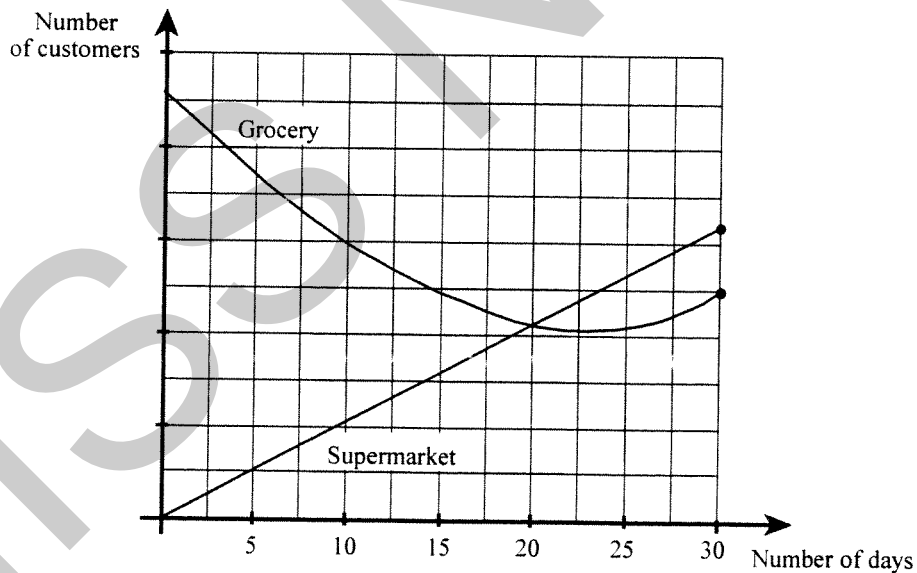
B)

x	y
0	20
1	80
1.5	160
3	1280

D)

x	y
20	0
80	1
320	2
1280	3

- 8 A new supermarket recently opened, just 2 km from a large grocery store. The graph below represents the daily change in the customer base for a 30-day period after the opening of the new store.



Which of the following statements are TRUE?

- After 30 days, the supermarket had more customers per day than the grocery store.
- On the 20th day, both the grocery store and supermarket had the same number of customers.
- After 10 days, the grocery store lost fewer customers than the supermarket gained.

- A) 1 and 2 only C) 2 and 3 only
 B) 1 and 3 only D) 1, 2 and 3

9 Julie and Caroline are saving for their trip to Europe. Right now, Julie has \$500 in a savings account and she plans to deposit \$20 more each week.

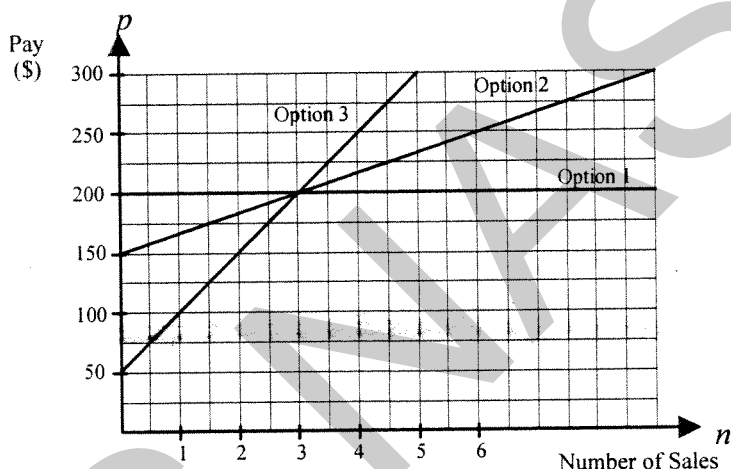
Caroline only has \$200 saved but she plans to deposit \$40 each week into her account.

Julie's savings plan can be represented by the function $\$(20n + 500)$ while Caroline's can be represented by the function $\$(40n + 200)$, where n represents the number of weeks.

In how many weeks will the girls have saved the same amount of money?

10 A store manager is hiring sales people. During the interviews, he gives each candidate three different options of weekly pay.

Given that n is the number of sales and p is the amount of pay in dollars, the following graph shows the three options offered to the candidates: Which option of weekly pay would encourage the greatest number of sales?



11 Two companies offer to cut down trees. The cost depends on the time required for a given tree-cutting job. This situation is represented by the following system of relations:

$$y_A = 115x + 50$$

$$y_B = 75x + 170$$

Where

x : the time (in hours) needed to complete the tree cutting job

y_A : the cost (in dollars) if company A does the tree cutting job

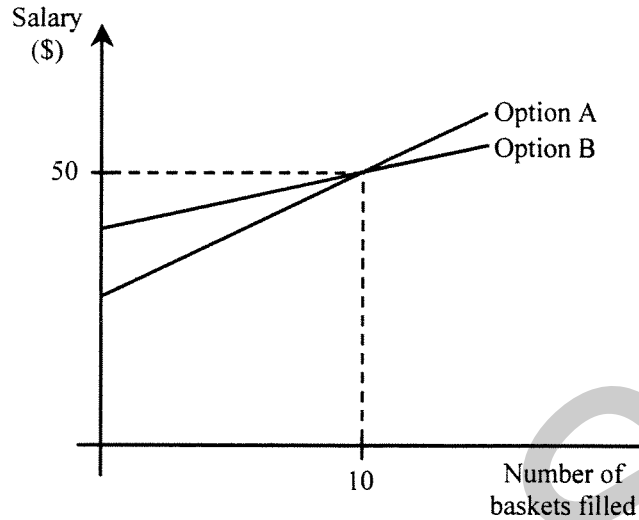
y_B : the cost (in dollars) if company B does the tree cutting job

Which one of the following statements is TRUE?

- A) If the tree-cutting job takes 2.5 hours to complete, the cost is the same no matter which company is hired.
- B) If the tree-cutting job takes 6 hours to complete, you save \$120 if you hire company B.
- C) If the tree-cutting job takes less than 4.5 hours to complete, it is cheaper to hire company A.
- D) If the tree-cutting job takes between 1 and 2 hours to complete, it is cheaper to hire company B.

- 12 The salary that a farmer pays his strawberry pickers can be determined according to two different options.

The following graph shows the relationship between the salary paid and the number of baskets of strawberries filled.



According to this graph, which one of the following statements is TRUE?

- A) The base salary under option A is higher than the base salary under option B.
- B) The amount paid for each basket filled is greater under option B than under option A.
- C) If they fill between 8 and 15 baskets, workers get a better deal under option B.
- D) Workers get a better deal under option A if they fill more than 10 baskets of strawberries.

- 13 Pierre and Gordon are designing a rectangular flowerbed. Each designer used a different algebraic expression for the perimeter of the rectangle.

Pierre's expression for the perimeter $y = 2(x + 9)$

Gordon's expression for the perimeter $y = 3x - 6$

Calculate the length (x) of the rectangular flowerbed.

14 Karim wants to go downhill skiing.

If he rents equipment at the ski hill, he will have to pay \$33 a day. This price includes the lift ticket.

If he has his own equipment, the lift ticket will cost \$16 a day. He can buy equipment for \$500.

How many one-day ski trips will it take before it becomes cheaper for Karim to buy his equipment?

15 Kim wants to rent a car to visit Montreal. She has a choice between two car-rental companies. The basic price quoted by the first company was \$30 plus \$0.25 per kilometre, while the second simply charges \$0.50 per kilometre.

Let x represent the number of kilometres driven and y the total cost of renting the car.

Which system of linear relations represents this situation?

A) $y_1 = 0.25x + 30$
 $y_2 = x + 0.50$

C) $y_1 = 30x + 0.25$
 $y_2 = 0.50x$

B) $y_1 = 30$
 $y_2 = 0.50x$

D) $y_1 = 0.25x + 30$
 $y_2 = 0.50x$

16 Fred paid \$14 400 for a new car, while Andrée bought a used car for \$8800.

Fred spends an average of \$400 a year in maintenance costs whereas Andrée averages \$1200 a year.

After how many years will the total cost of the two cars be equal?

17 The cost of transporting a car on a ferry is a set price for the car plus an additional charge for each person in the car.

The cost for a car with 2 people is \$24, whereas the cost for a car with 5 people is \$33.

What is the cost for a car with 3 people?

18 An engineer is checking the city's water supply. To do so, she needs to empty two water tanks, starting at the same time.

Tank A contains 1800 litres of water and is emptying at a rate of 225 litres per hour.

Tank B contains 1575 litres of water and is emptying at a rate of 150 litres per hour.

Once the first tank has emptied, how long does the engineer have to wait for the second tank to finish emptying?

- 19 Diane is conducting a science experiment comparing the masses of three different organisms – bacteria, plant and fungus.

She begins with 0.25 g of bacteria in a dish, a 140 g potted plant, and a single fungus cell.

She records their masses every day for two weeks. The change in the mass of each organism can be determined by the following equations:

$$\begin{array}{ll} \text{Bacteria} & y_1 = 0.25(1.75)^x \\ \text{Plant} & y_2 = 1.05x + 140 \\ \text{Fungus} & y_3 = 21.05x \end{array}$$

where x is the number of days elapsed since the start of the experiment
 y is the mass of the organism in grams

Which of the following statements is TRUE regarding the masses of these three organisms?

- A) At the end of the 12th day, the fungus has the greatest mass and the bacteria the least.
- B) By the end of the experiment, the fungus has more than twice the mass of the bacteria.
- C) The plant and the fungus have the same mass seven days after the experiment had started.
- D) When the mass of the plant is combined with an equal mass of the fungus, the total is 500 grams.

- 20 Mark, Roxanne and Julie have just started to work. They want to compare their salaries.

- Mark will receive \$18 000 the first year, then a raise of \$800 for each of the following years.
- Roxanne calculates her salary (S) according to the number of years of service (x) with the following linear relation :

$$S = 200x + 24\,000$$

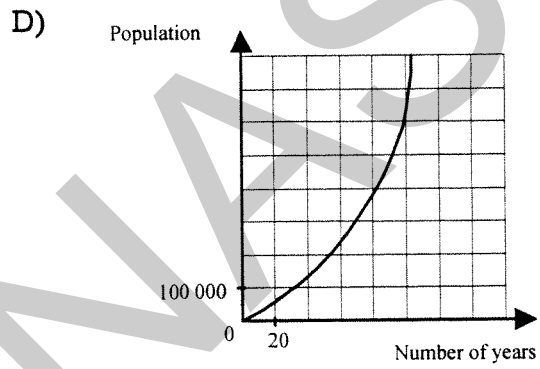
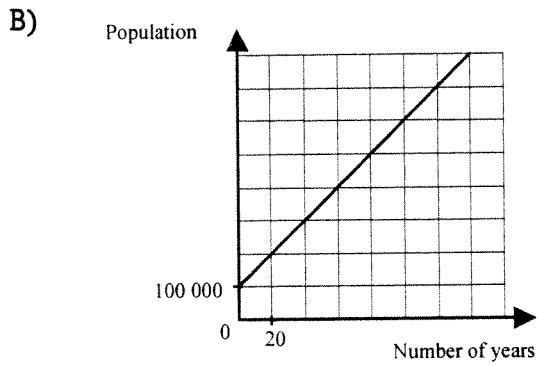
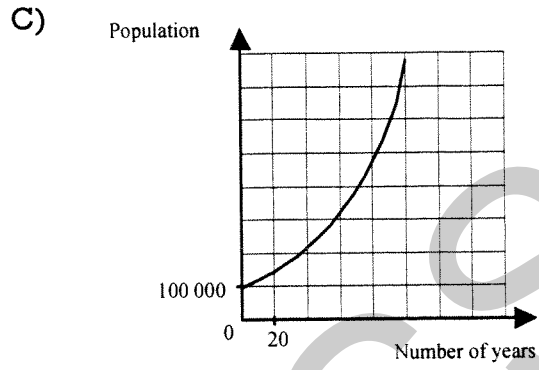
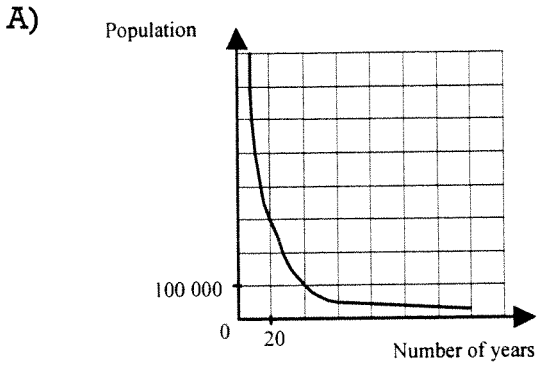
- Julie uses the table of values below to determine her salary according to the number of years of service.

Number of years working (x)	0	2	4	6	8	...
Salary (in \$)	26 000	27 600	29 200	30 800	32 400	...

What will Julie's salary be when both Mark and Roxanne are earning the same salary?

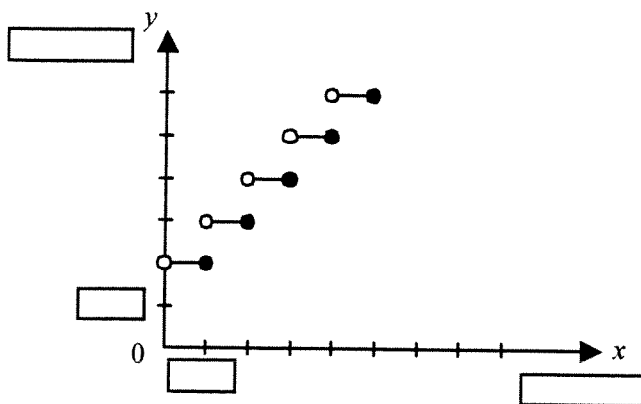
21 The population of a city of 100 000 increases by 2% each year. A study was made of the relationship between the number of years elapsed and the population growth of the city.

Which of the graphs below represents this situation?



- 22 A long distance call between two particular cities costs \$1.00 for the first minute. Each additional minute costs \$0.50.

The step graph below represents this situation.



From the given information, which of the following choices represents the dependent variable, the independent variable and the appropriate scale for each axis ?

	(x) Dependent Variable	(y) Independent Variable	Scale	
			x-axis	y-axis
A)	LENGTH	COST \$	1	0.50
B)	COST \$	LENGTH	0.50	1
C)	LENGTH	COST \$	0.50	1
D)	COST \$	LENGTH	1	0.50

- 23 Match each situation with its table of values.

Situation

1 The first prize of a lottery is \$40 000. Lise wonders how much each winner will get, depending on the number of winners.

A)

x	2	4	6	8
y	20 000	10 000	5000	2500

B)

x	2	4	6	8
y	20 000	10 000	6667	5000

C)

x	2	4	6	8
y	32 000	24 000	16 000	8000

D)

x	2	4	6	8
y	32 400	26 244	21 258	17 219

2 John buys a \$40 000 car. He estimates that his car will lose 10% of its value each year for the next 10 years. He has estimated the value of his car to the nearest dollar.

Table of values

(to the nearest dollar)

- 24 A lab technician notes that the number of type A bacteria doubles every hour whereas the number of type B bacteria triples every hour.

At the outset there are 1000 of type A bacteria and 500 of type B bacteria.

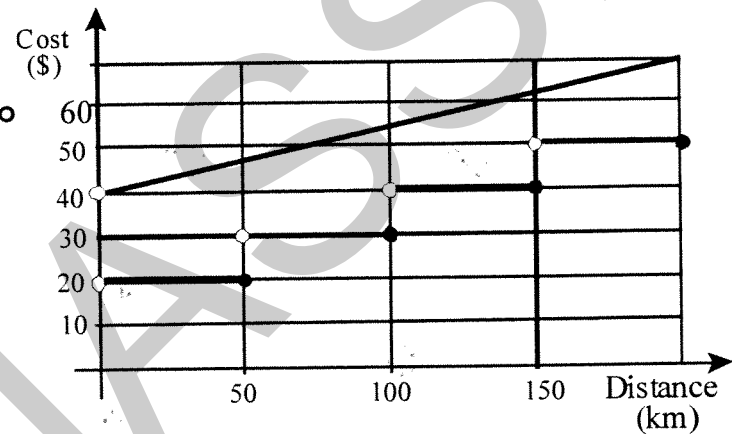
Which of the two bacteria will be more numerous after five hours?

- 25 A car leasing company has two rental plans.

The following graph shows the relationship between the distance travelled and the cost of renting a car under each plan.

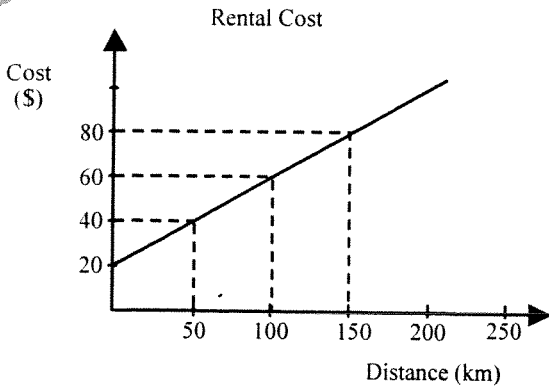
A customer drives 240 km in a rented car.

What is the exact difference in cost between the two plans?



- 26 Paul has the option of renting a car for one day from one of three car rental agencies. The amount they charge is illustrated in three different ways.

Company A uses the following graph to display its rates:



Company B has the following sign posted:

We charge a flat rate of \$115 a day regardless of distance travelled.

Company C uses the following table to display its costs:

Distance (km)]0, 50[[50, 100[[100, 150[[150, 200[...
Cost (\$)	80	85	90	95	...

What would be the difference in the cost between leasing a car from the most expensive company and the least expensive company if Paul drives a distance of 280 km?

- 27 The following brainteaser came up during a t.v. quiz show.

M_1 : An amount of \$0.01 triples every day.

M_2 : An amount of \$1.00 doubles every day.

After 5 days, what will be the difference between the two amounts?

28 The cost of a square tile is determined using the equation:

$$C = 3m^2$$

where C = cost of a tile

m = length of a side of the tile

Which one of the following tables of values represents this relation?

A)

m	2	4	6	8	10
C	6	12	18	24	30

B)

m	2	4	6	8	10
C	12	48	108	192	300

C)

m	2	4	6	8	10
C	36	144	324	576	900

D)

m	2	4	6	8	10
C	12	48	192	768	3072

29 A mayor has been studying the population of her town. On January 1, 1995, the population was 480 000. She has noticed that the population has been decreasing by 5% per year.

If the population continues to decrease at this rate, what will the population be on January 1, 2001?

A) 336 000

C) 371 415

B) 352 844

D) 643 246