UNIT 8

GRAPHING AND DATA ANALYSIS

8-1 Coordinates and Graphing
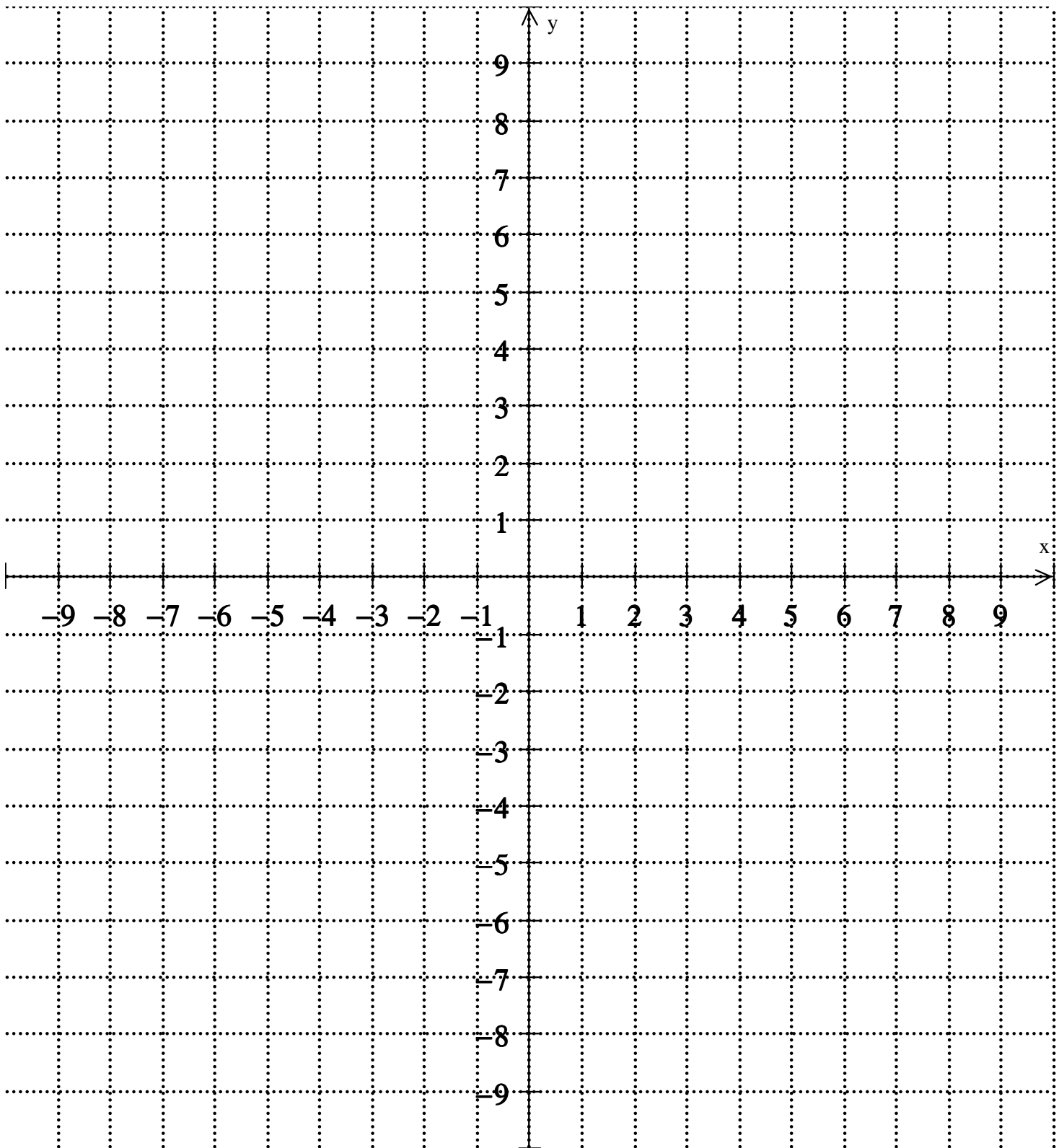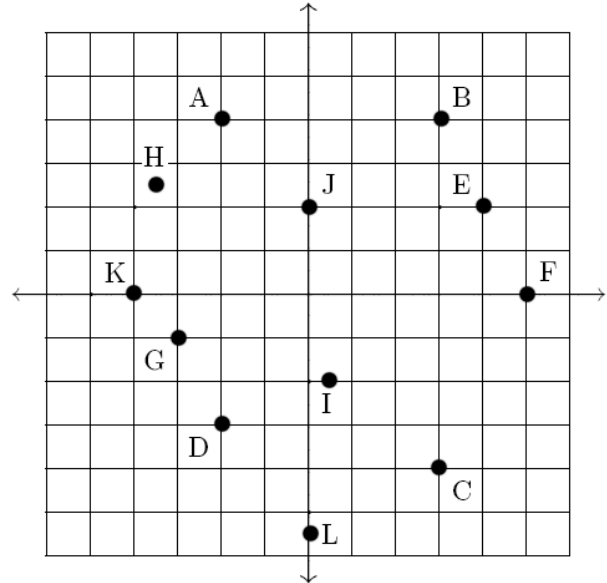
8-1 Coordinates and Graphing

NOTE: In all graphs in section 8-1, both horizontal and vertical grid lines will be spaced one unit apart.

1. Give the coordinates of each point:

A_____   B_____
C_____   D_____
E_____   F_____
G_____   H_____
I_____   J_____
K_____   L_____

2. a) How far from the x-axis is the point (3, -4)?
    b) How far from the y-axis is the point (-7, 4)?
    c) How far from the point (-2,3) is the point (5,3)?
    d) Give at least 5 different points, which are 5 units away from the origin.

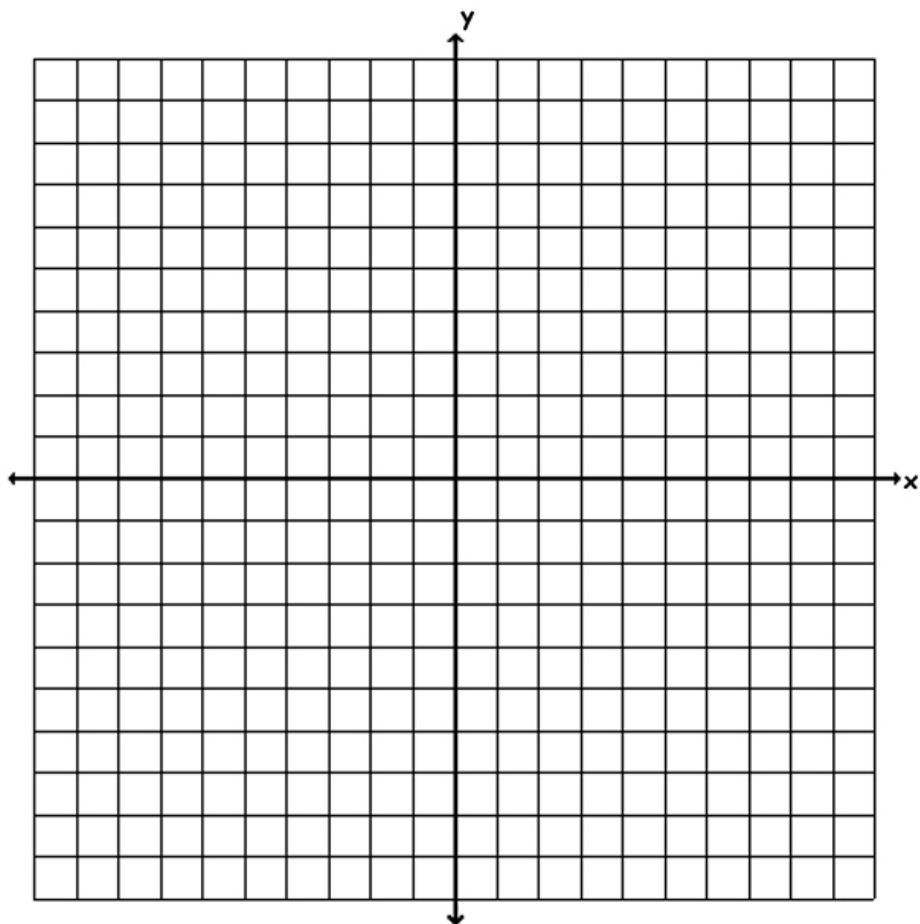3. Plot and label the following points on the grid (you may need to estimate for some).

A (3, 7)   B (4, 2)
C (-3, 8)   D (-5, -2)
E (0, 5)   F (2, 0)
G (-6, 0)   H (0, -4)
I (2.5, -5)   J (-4.5, 3)
K (-0.5, -6.5)
L (5.25, 6.75)

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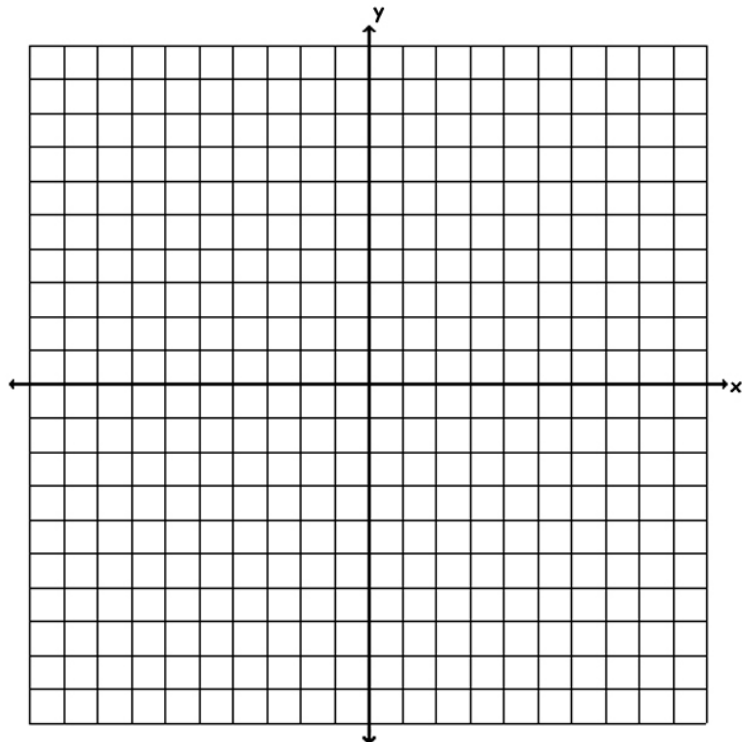
4. a) Complete the table of values for the relation $y = 2x - 1$.

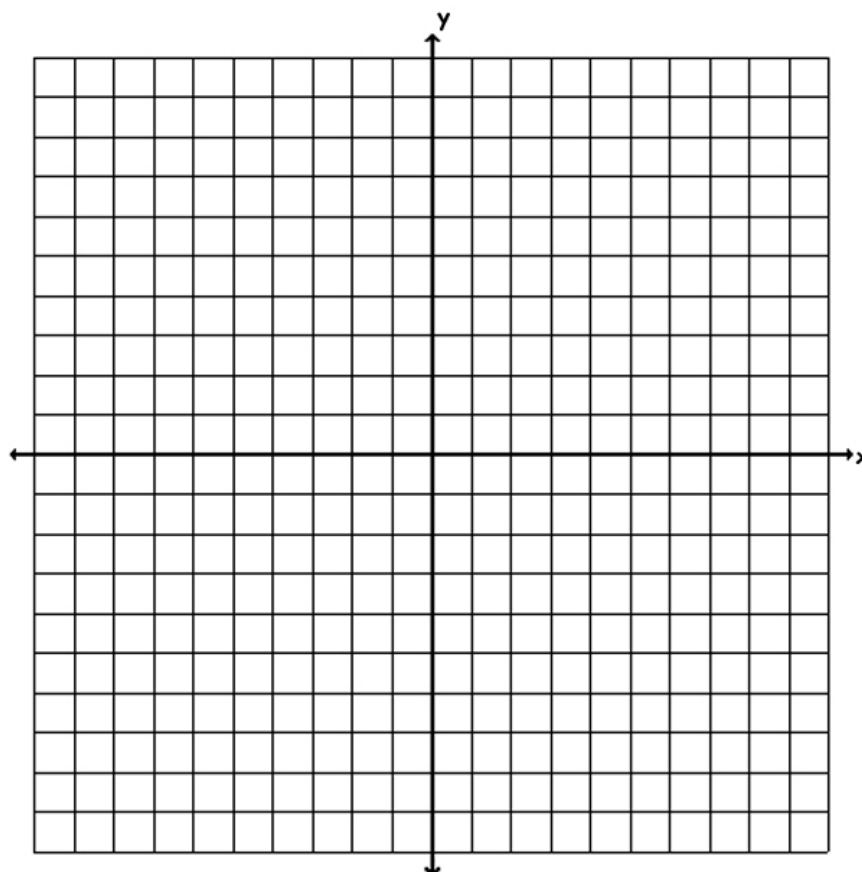| y					1	-3	9	-6
x	0	2	-4	0.5				

b) Using the points, plot the relation $y = 2x - 1$ on the grid below.

5. a) Complete the table of values for the relation $x + y = 8$. (Choose your own values. Note that $x + y = 8$ is the same as $y = -x + 8$.)

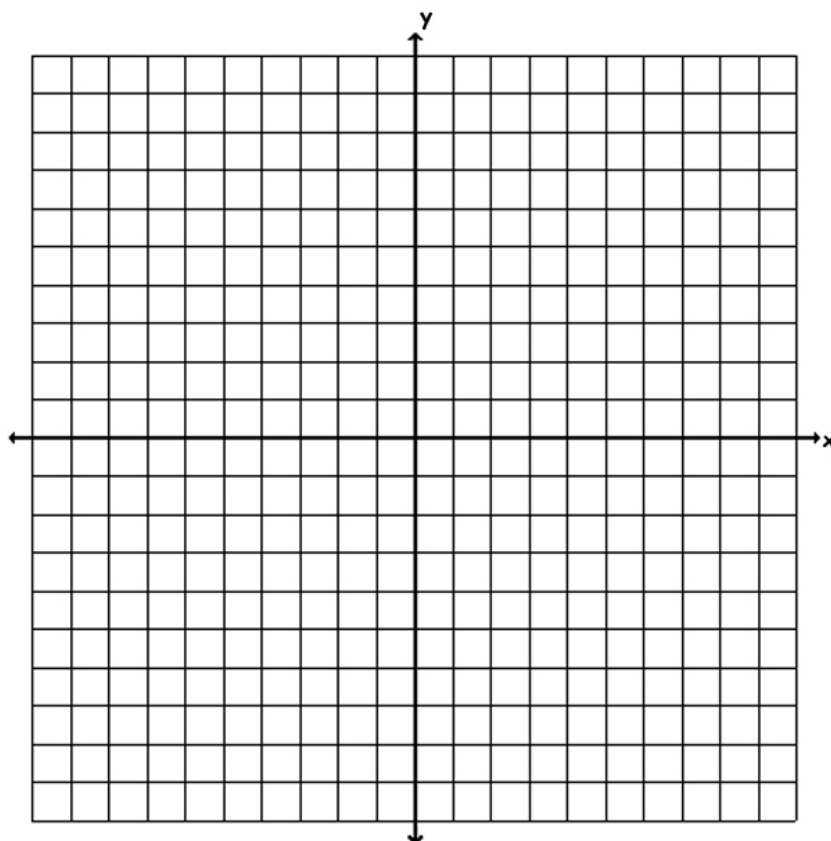| y								
x								

b) Using the table, plot the relation $x + y = 8$ on the grid below.

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6. a) Complete the table of values for the relation $y = \frac{1}{2}x + 3$. If possible, try to choose x-values, which will give whole numbers for y, but also make sure all your points will fit on the grid.

y									
x									

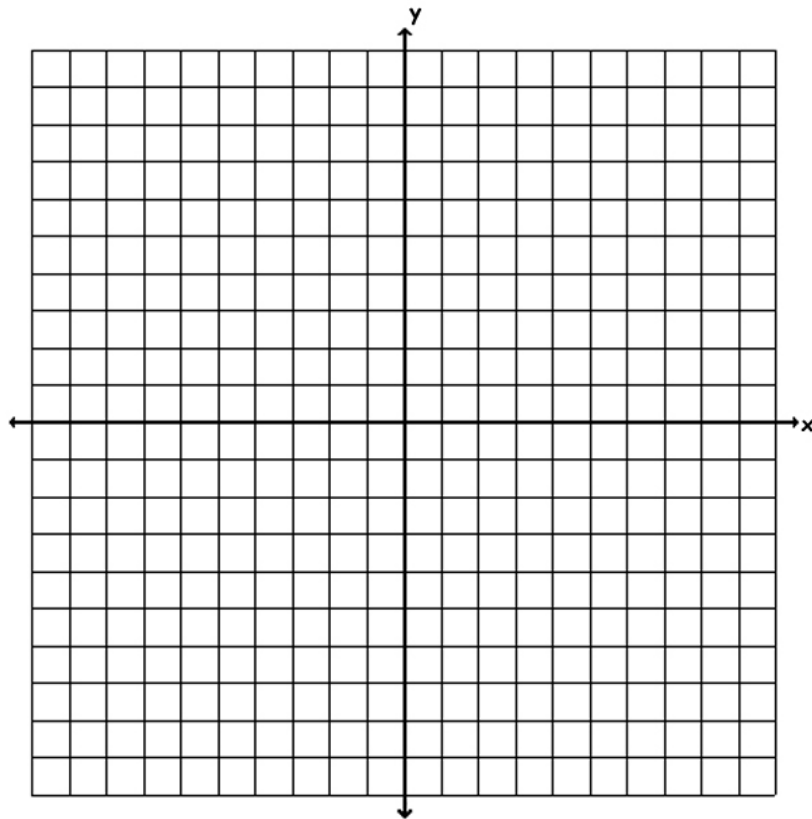c) Using the points, plot the relation $y = \frac{1}{2}x + 3$ on the grid below.

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7. Compare and contrast the three graphs you have just drawn in questions 4, 5 and 6.

8. The points (2,3) and (7, –2) are two vertices (corner points) of a square.
a) What are the coordinates of the other two vertices? Find all possible answers
b) What is the area of the square?

9. Two vertices of a rectangle with area 24 square units are (5, –2) and (5, –5). If the other two vertices have both negative x and y coordinates, what are the coordinates of the other two vertices?
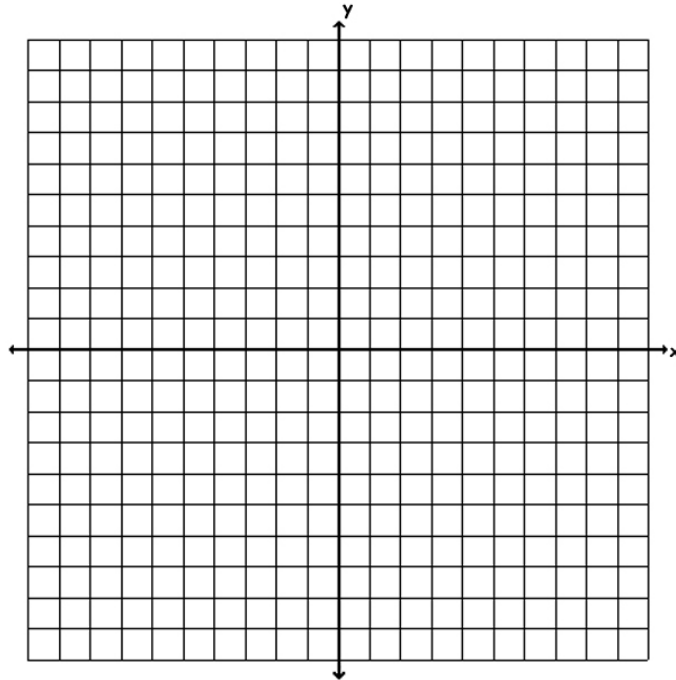
10. The vertices of a triangle are (–4, –2), (1, 3), and (6, –2).
a) Find the area of the triangle.
b) What is the length of the shortest side?
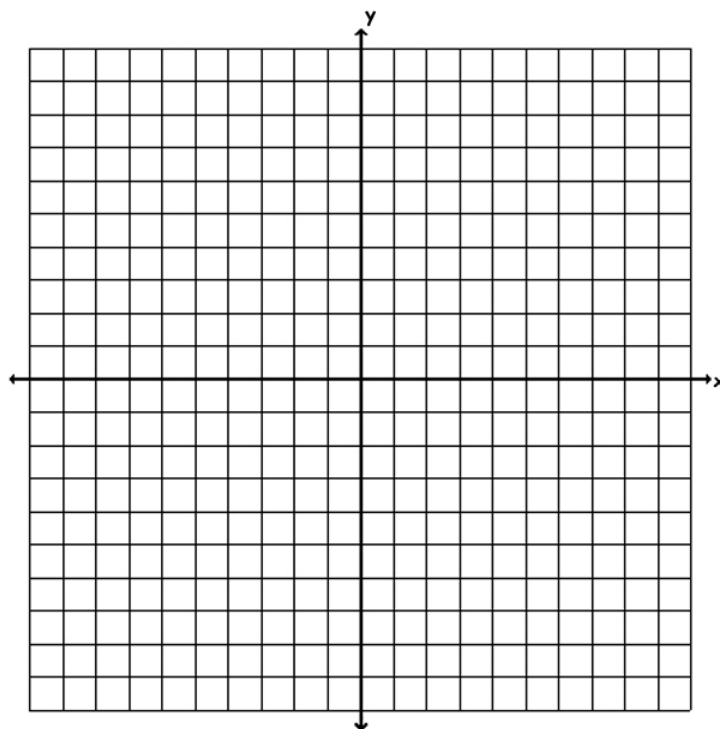
11. A quadrilateral has vertices at (–4, 1), (0, 4), (7, 4) and (3, 1).
a) What type of quadrilateral is this?
b) What is its area?
c) What is its perimeter?

12. If a relation is plotted, as in the two examples shown, it is possible to find out the equation of those relations, do so.
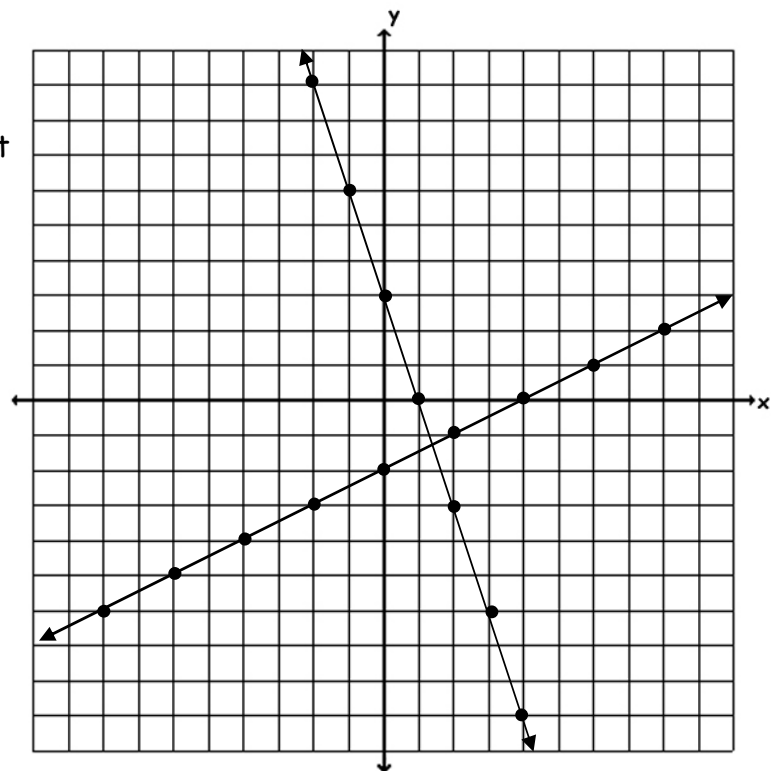
8-2 Graphing Data I (Line Graphs)
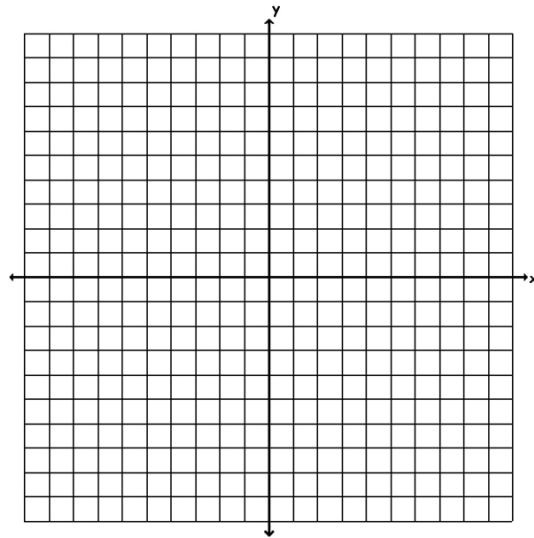
8-2 Graphing Data I (Line Graphs)

1. At Pasquale's Pizza cheese and tomato sauce is included on all pizzas. Here is a partial price list for a large pizza.

# of toppings	Price
1	$17
3	$21
6	$27

Now construct a graph for this data. Make sure to label your axes and show your scale.
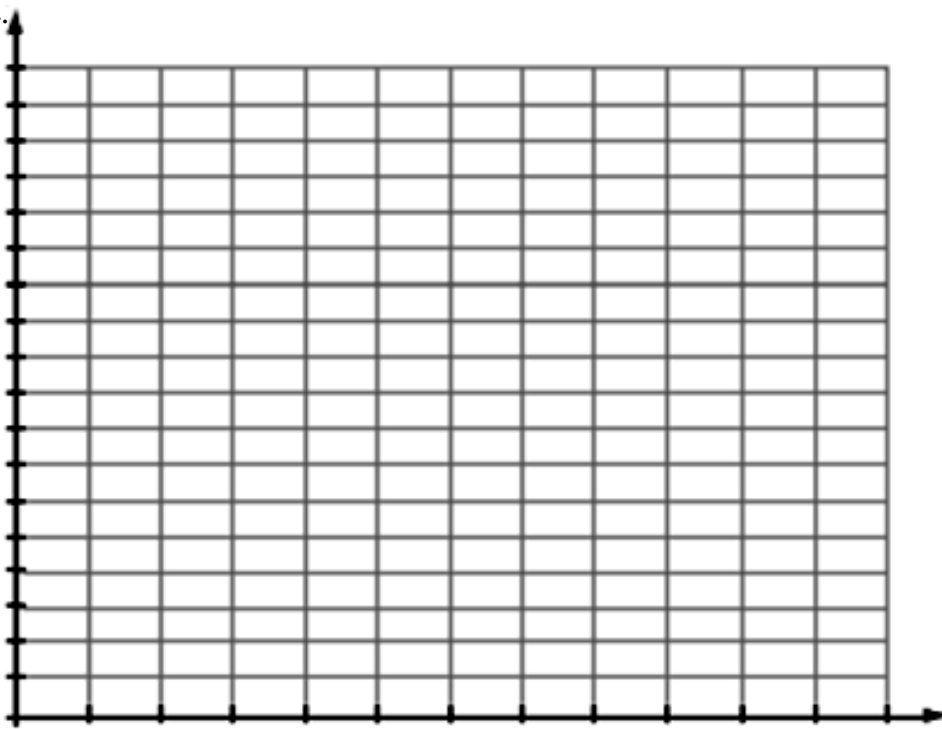
a) How much would a large pizza with no toppings cost?_____

b) How much would a large pizza with 5 toppings cost?_____

c) How many toppings could you get for $34?_____

d) What is the price per topping?_____

e) Determine an equation for this relation: _____

2. Ivan Toksalotski was looking at his charges for text messaging on his last several phone bills. Here is what he found:

# of texts	cost
60	$12.00
25	$5.00
90	$18.00
10	$2.00

Now construct a graph for this data. Make sure to label your axes and show your scale.
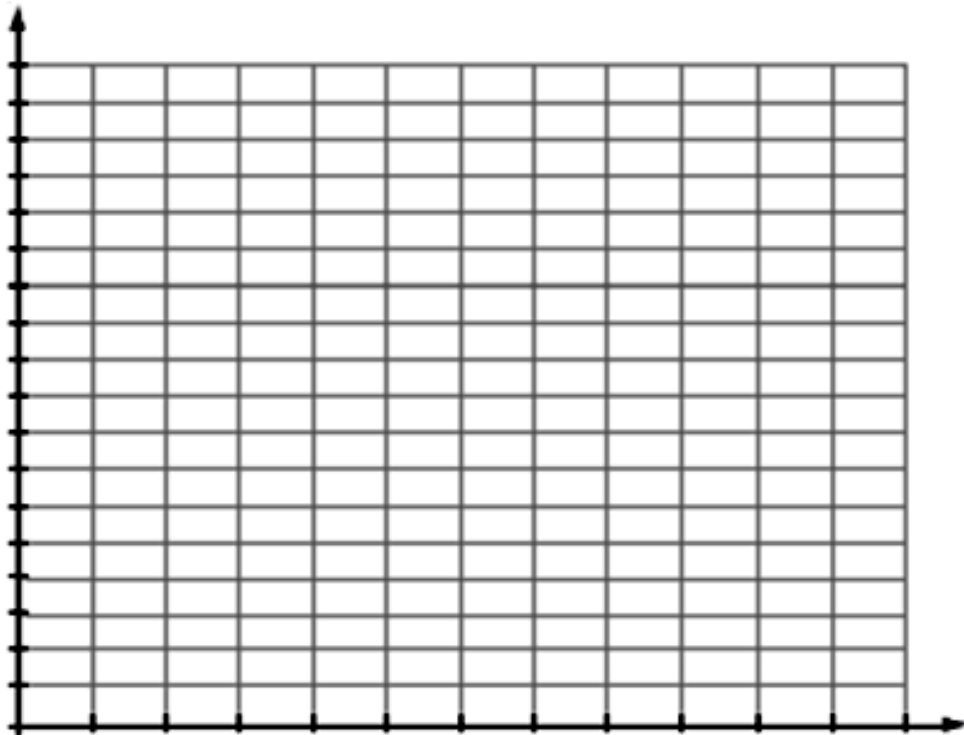
a) How much would it cost to send 80 texts?_____

b) How many texts could you send for $15?_____

c) What is the price per text?_____

d) Determine an equation for this relation: _____

3. A watermelon was dropped off the top of a 200m building, and its height above ground was measured at time intervals one second apart. Here is the data:

Height (m)	200	195	180	155	120	75	20
Time (s)	0	1	2	3	4	5	6

Construct a graph of height vs time. Make sure to label your axes and show your scale.
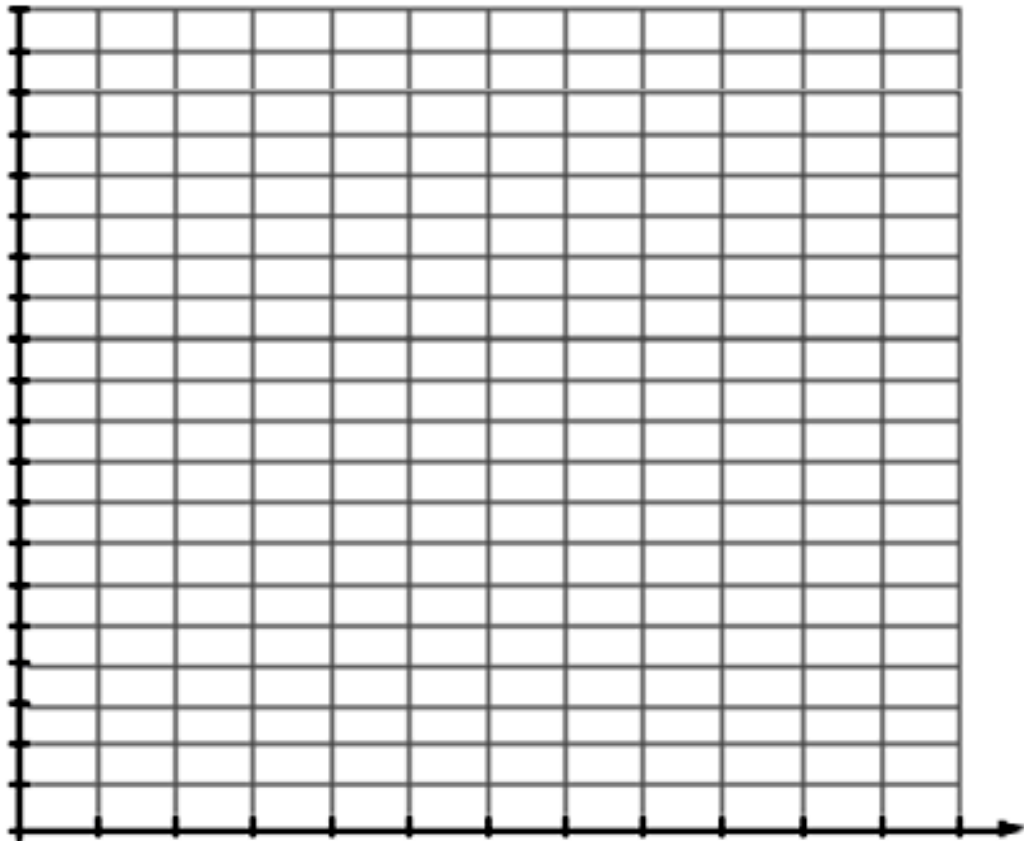
a) Is this graph a straight line? Why do you think this is?

b) Estimate to the nearest tenth of a second when the watermelon would hit the ground.

4. A water-balloon was shot up into the air and its height above ground was measured at time intervals one second apart. Here is the data:

Height (ft)	5	40	65	80	85	80	65	40	5
Time (s)	0	1	2	3	4	5	6	7	8

Construct a graph of height vs time. Make sure to label your axes and show your scale.
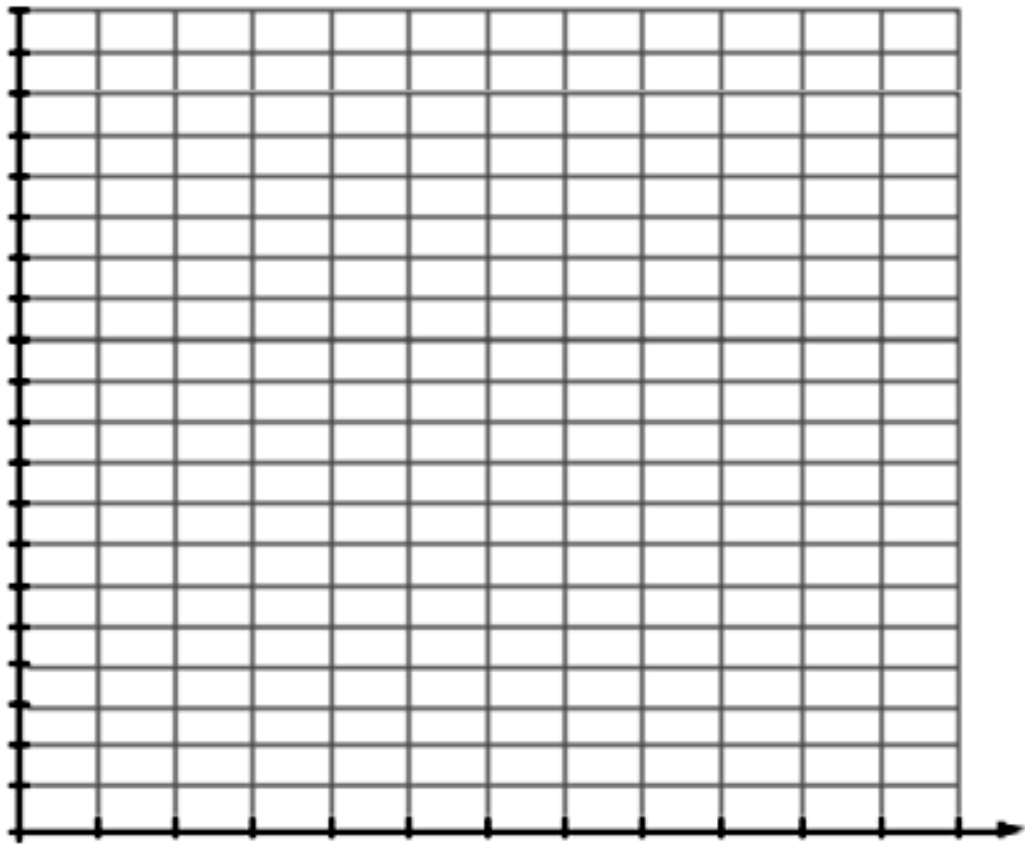
a) What shape is this graph?

b) What does the y-intercept (where the graph hits the y-axis) physically tell you about the water-balloon?
(The y-axis is actually the height or "h" axis in this case!)

5. The following data was collected for Vancouver in 2007, graph the data on the grid below.

Date	Day Number (n)	Hours of Daylight
Jan 01	0	8.3
Jan 31	30	9.4
Mar 01	60	11.0
Mar 31	90	12.8
Apr 30	120	14.6
May 30	150	15.9
Jun 29	180	16.2
Jul 29	210	15.3
Aug 28	240	13.7
Sep 27	270	11.9
Oct 27	300	10.1
Nov 26	330	8.7
Dec 26	360	8.2
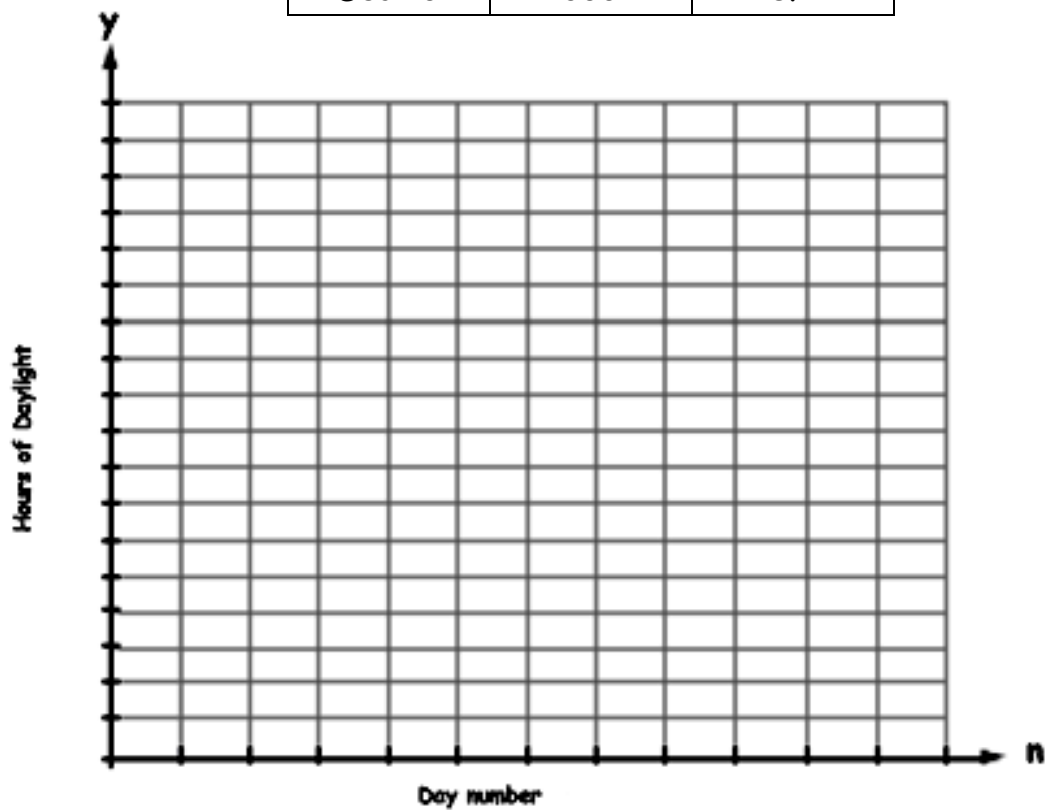
a) Approximately when was the longest day of the year (the day with the most hours of sunlight)?

b) Approximately when was the shortest day of the year (the day with the least hours of sunlight)?

c) One factor that affects a region's growing season is hours of daylight. Vancouver's growing season generally starts when there are 12 or more hours of daylight. From the graph predict the start and end date of the growing season in Vancouver.

d) How would the graph look different if the same data was collected in Mexico City? Draw a sketch of what you think it might look like.

e) How would the graph look different if the same data was collected in Sydney Australia? Draw a sketch of what you think it might look like.

6. Discussion question: How can you tell if a relation is linear?

7.

World Population (billions)	1	2	3	4	5	6	7
Year	1800	1927	1960	1974	1987	1998	2011

http://www.un.org/esa/population/publications

a)   On the grid below, show this data in the most in the most useful way you can think of.
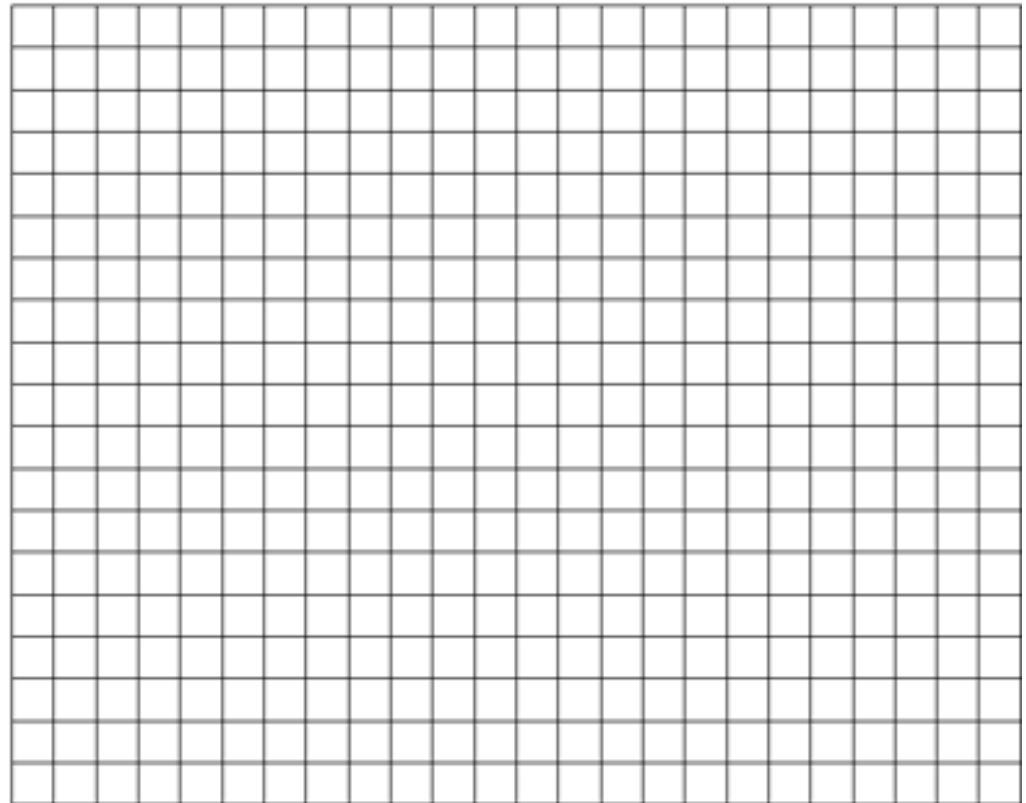
b)   What trend, if any, can be seen from your graph?

c)   Using your graph,
   -Predict when the world population will reach 8 billion: _____
   -Estimate when the world population was half of a billion (500 000 000): _____
   -Estimate the world population in the year 1970: _____

   2000: _____

   2020: _____

8-3 Interpreting Graphs

8-3 Interpreting Graphs

1. Below is a graph of the final marks in Mr. Tartaglia's Math 8 class.

MATH 8 FINAL MARKS
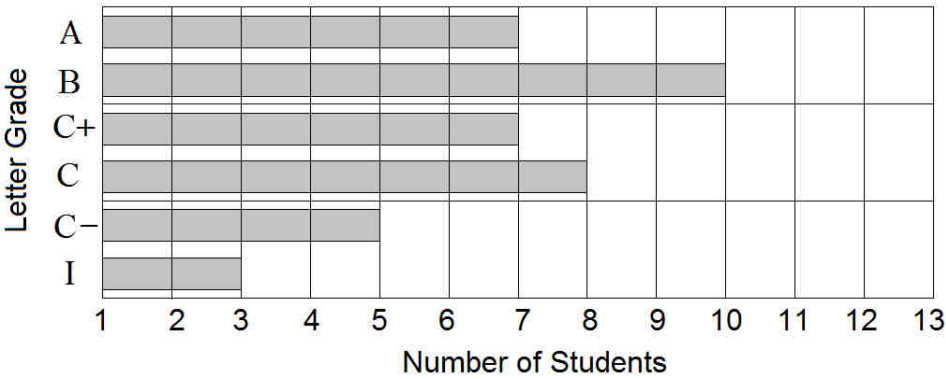
a) How many students were in the class?

b) Fill in the following chart:

	A	B	C+	C	C-	I
# of students						
% of students						

c) Use the percentages to draw a pie chart to represent this data. Remember there are 360 degrees in a circle. So for example if 10% of students got an A, then you would draw a central angle of 10% of 360 = 36 degrees.
Be sure to label each piece with the grade and percentage.
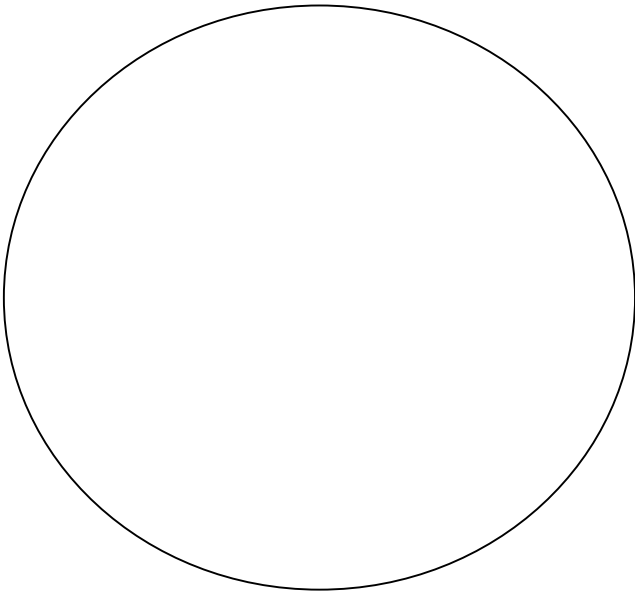
d) What are the strengths and weaknesses of the bar graph?

e) What are the strengths and weaknesses of the circle graph?

f) Which would you use? Why?

2. Here are the results for Vancouver students on the Math 12 provincial exam for the past several years.

Year	2008	2007	2006	2005	2004	2003	2002	2001	2000	1999	1998
Average Mark	83.5	84.3	84.5	81.7	76.8	81.0	81.5	74.0	74.4	68.5	71.6

a) Display this data on a line graph.
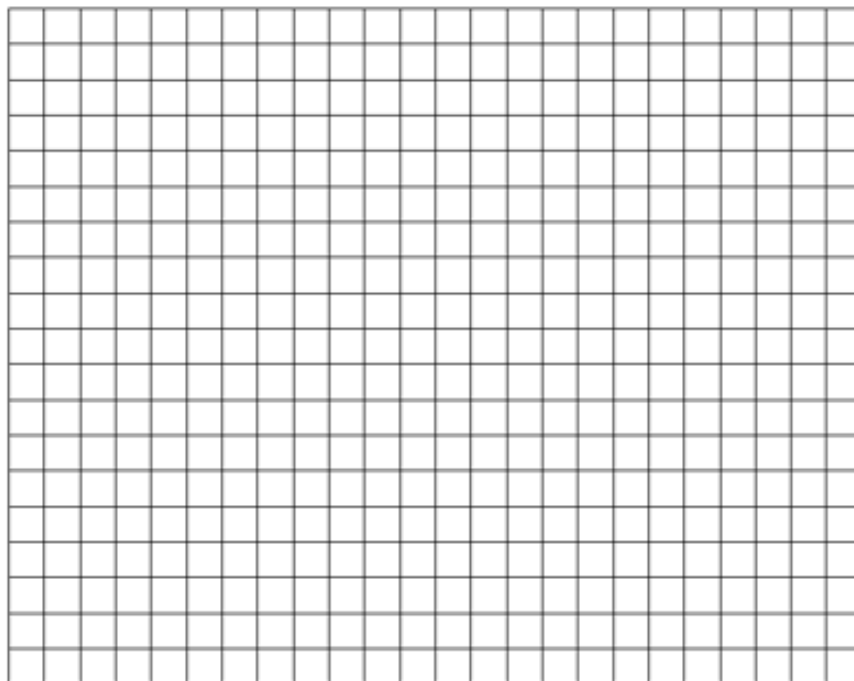
b) Display this data on a bar graph.
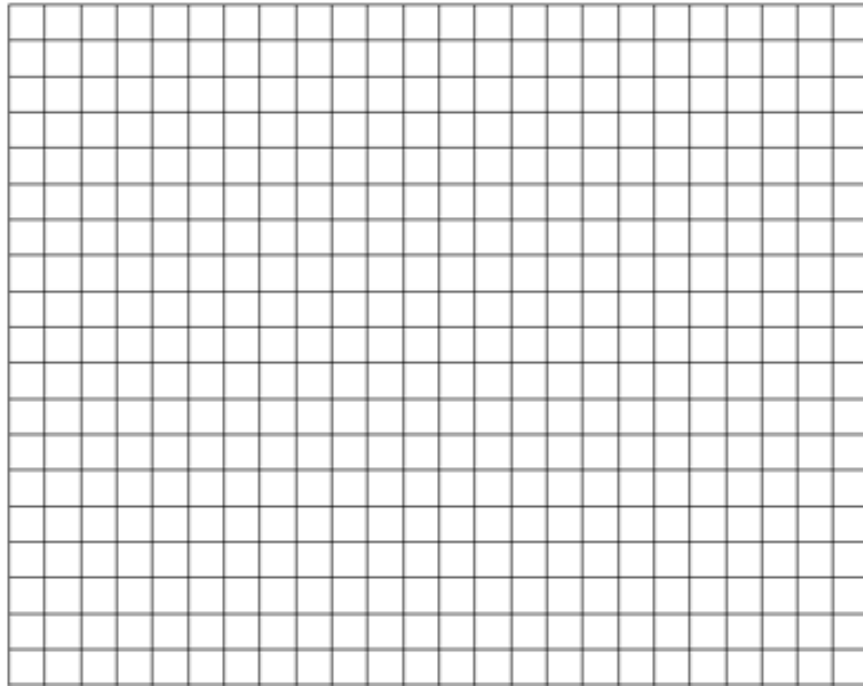
c) Is there a trend to the data? If so, what is it? Which graph shows it more clearly?

d) Predict the average exam mark for 2009. What about 2015?

e) What are the benefits of each type of graph?

3. Below is data collected from the past several years on the number of A's given out in two classes of Math 12.

	2003-04	2004-05	2005-06	2006-07	2007-08
Boys	8	6	6	13	14
Girls	6	8	7	5	12

Display the data in a double bar graph.
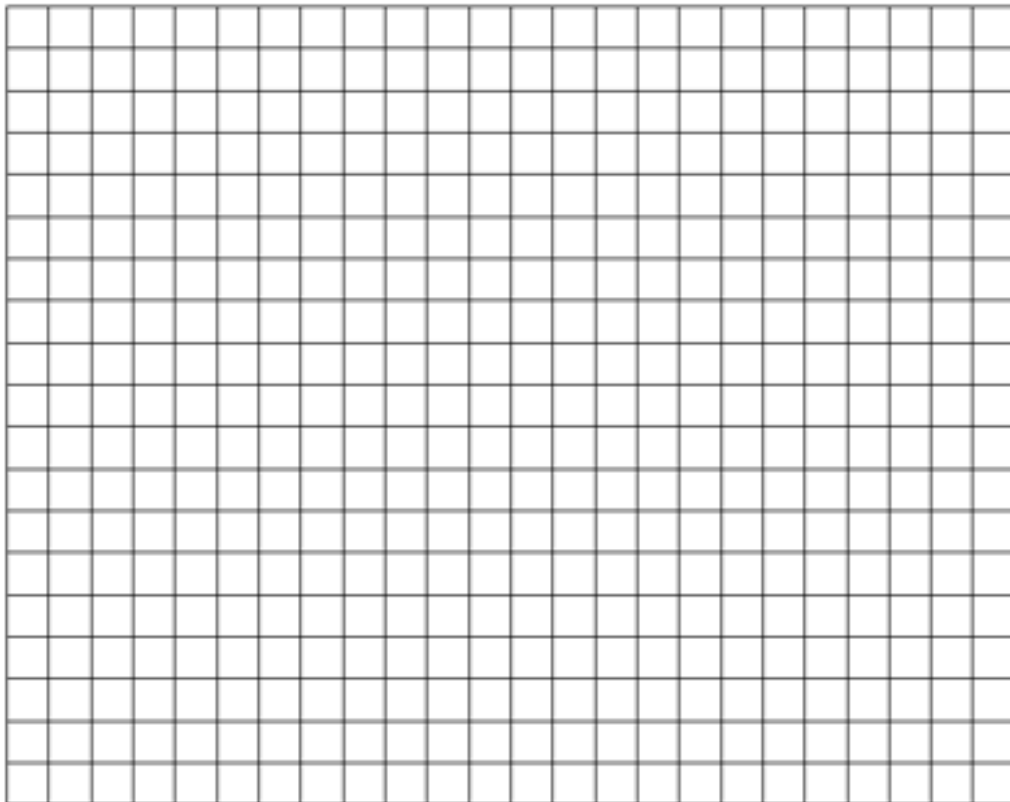
a) What other type of graph could be used to show this data?

b) Can you make any conclusions from the data? If so, what?

c) What information are you not told in this data that could affect your conclusions?

2.

Number of Players in Regular Season by Nationality
©2012 QuantHockey.com

Legend: Canada, United States, Sweden, Russia, Czech Republic, Finland, Slovakia, Other
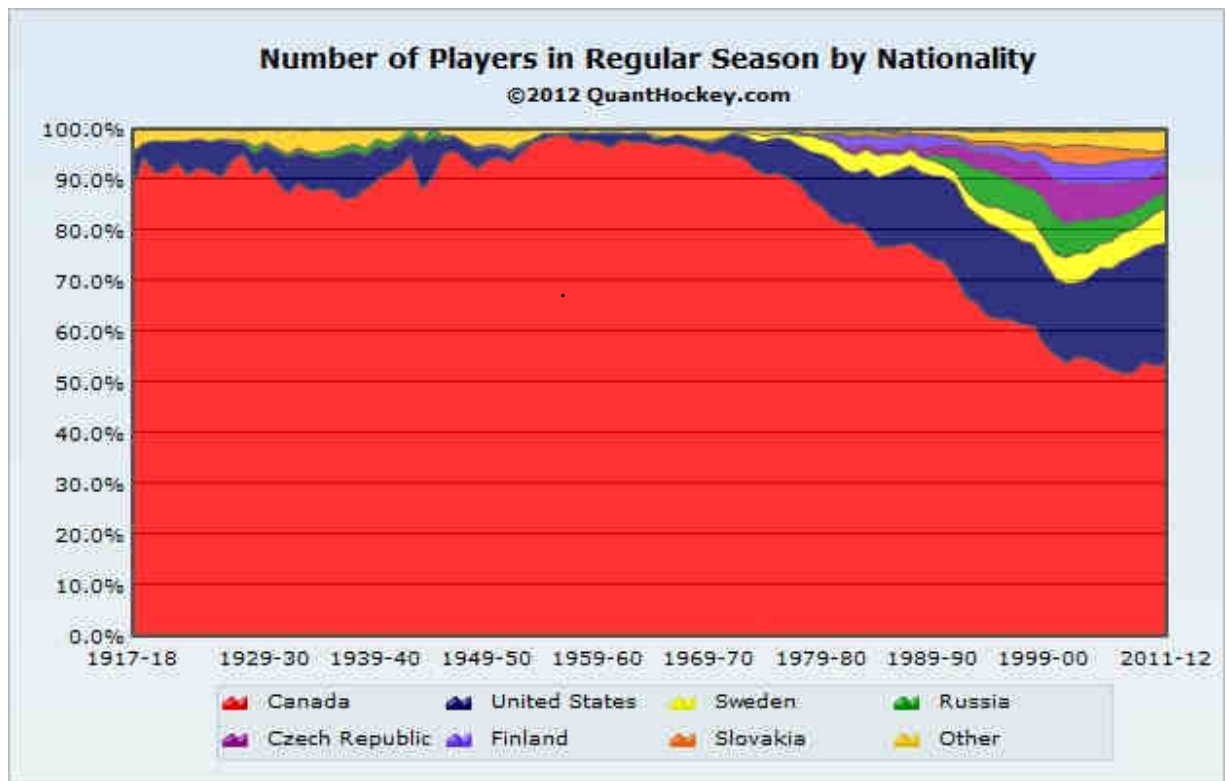
http://www.quanthockey.com/TS/TS_PlayerNationalities.php

Discuss what this graph tells you.

3.   THE NATURAL SCIENCE AND ENGINEERING SUPPLY CHAIN

M Male
F Female

Doctoral Degrees (2007)   M 1,198   F 647

Master's Degrees (2003)   M 4,109   F 2,619

Bachelor's Degrees (2001)   M 16,359   F 10,946

High School Diplomas (1997)   M 150,848   F 145,513

Grade 1 Enrolment (1985)   M 200,288   F 185,116
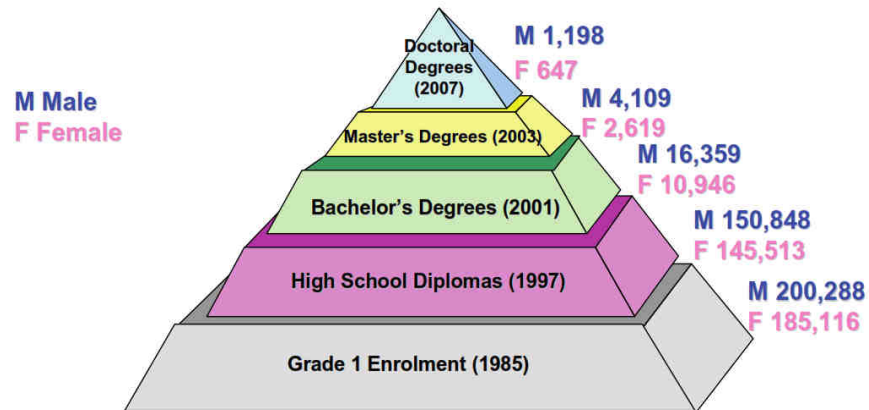
http://www.nserc-crsnggc.ca/_doc/Reports-Rapports/Women_Science_Engineering_e.pdf

Discuss what this graph tells you.

4. NUMBER OF CHILDREN AGED 14 AND UNDER AND OF PERSONS AGED 65 AND OVER, CANADA, 1921 TO 2011
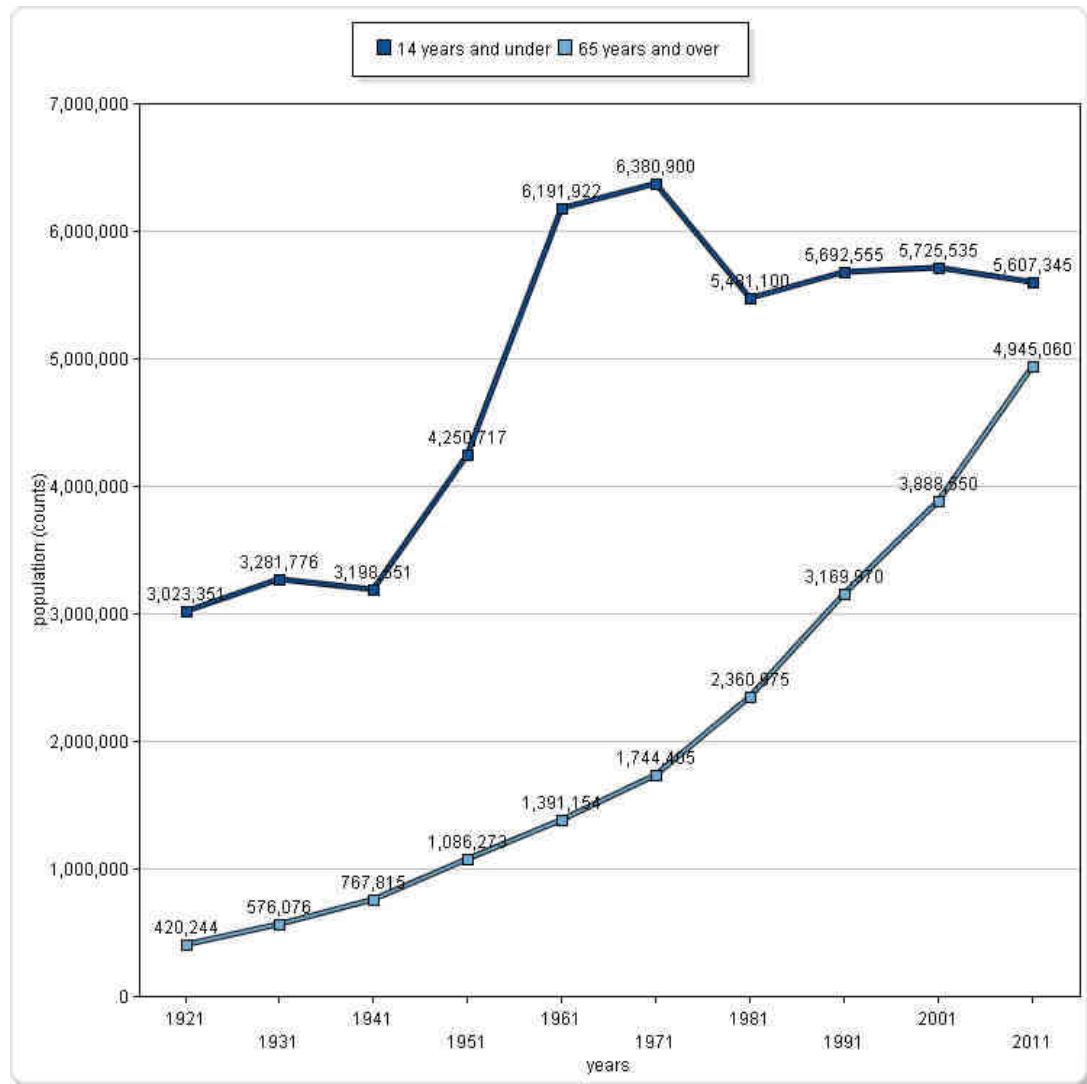
Discuss what this graph tells you.

8-4 Graphing Data II (Other Types of Graphs)

8-4 Graphing Data II (Other Types of Graphs)

For each set of data, show the best way (or ways) to represent it graphically. You may need extra space and/or extra graph paper. Some of the data sets contain more than one kind of information which needs to be shown, and some of the data sets contain more information than you might be able to graph.

Types of graphs include pie charts, pictographs, histograms, bar charts (single, double and multiple) as well as line graphs, and perhaps others.

1.   TOP FIVE WORLDWIDE SMARTPHONE VENDORS 2012

Vendor	Market Share(%)
Samsung	29.1
Apple	24.2
Nokia	8.2
Research In Motion	6.7
HTC	4.8
Others	27.0
Total	100.0

http://www.idc.com/getdoc.jsp?containerId=prUS23455612

2.

BLOOD TYPE DISTRIBUTION

Blood Type (Donor)	% of Blood Type Amongst all Canadians
A+	36
A-	6
O+	39
O-	7
B+	7.6
B-	1.4
AB+	2.5
AB-	0.5

http://www.bloodservices.ca

3. Temperature and Rainfall Vancouver BC

	Jan	Feb	Mar	Apr	May	Jun	Jul	Aug	Sep	Oct	Nov	Dec
Average high (°C)	6.8	8.4	10.6	13.5	16.8	19.6	22	22.3	19	13.9	9.3	6.8
Average low (°C)	2.7	3.4	4.6	6.5	9.5	12.2	14.1	14.4	11.6	8.2	4.8	2.8
Monthly rainfall (mm)	144	174	153	117	87	70	49	48	71	132	220	211

http://www.theweathernetwork.com/statistics/CABC0308

4. Population estimates by sex and age group as of July 1, 2011, Canada

Age group	Total	Male	Female
Total	34,482,779	17,104,098	17,378,681
0 to 4 years	1,921,203	982,889	938,314
5 to 9 years	1,823,983	938,803	885,180
10 to 14 years	1,899,661	975,748	923,913
15 to 19 years	2,196,437	1,123,767	1,072,670
20 to 24 years	2,402,234	1,234,223	1,168,011
25 to 29 years	2,419,280	1,227,544	1,191,736
30 to 34 years	2,348,086	1,173,463	1,174,623
35 to 39 years	2,290,396	1,149,025	1,141,371
40 to 44 years	2,396,726	1,206,180	1,190,546
45 to 49 years	2,750,685	1,384,979	1,365,706
50 to 54 years	2,668,169	1,333,326	1,334,843
55 to 59 years	2,354,191	1,161,120	1,193,071
60 to 64 years	2,038,290	998,378	1,039,912
65 to 69 years	1,534,466	744,151	790,315
70 to 74 years	1,142,574	538,828	603,746
75 to 79 years	918,295	415,433	502,862
80 to 84 years	703,048	293,347	409,701
85 to 89 years	439,034	157,271	281,763
90 to 94 years	179,895	52,717	127,178
95 to 99 years	48,557	11,338	37,219
100 years and over	7,569	1,568	6,001

http://www.statcan.gc.ca/daily-quotidien/110928/t110928a4-eng.htm

5.   Population by Province and Territory (2011)

Province/Territory	Population (Thousands)
Nunavut	33.3
Yukon	34.7
North West Territories	43.7
Prince Edward Island	145.9
Newfoundland and Labrador	510.6
New Brunswick	755.5
Nova Scotia	945.4
Saskatchewan	1 057.9
Manitoba	1 250.6
Alberta	3 779.4
British Columbia	4 573.3
Quebec	7 979.7
Ontario	13 373.0
Total	**34 482.8**

http://www.statcan.gc.ca/tables-tableaux/sum-som/l01/cst01/demo02a-eng.htm

6.   Olympic Medals from London 2012

Country	GOLD	SILVER	BRONZE
United States of America	46	29	29
Peoples Republic of China	38	27	22
Great Britain	29	17	19
Russian Federation	24	25	33
Republic of Korea	13	8	7
France	11	11	12
Germany	11	19	14
Italy	8	9	11
Hungary	8	4	5
Australia	7	16	12
Japan	7	14	17

7.

What do you usually eat for breakfast?

Food group	Elementary			Secondary		
	Girls	Boys	All students	Girls	Boys	All students
			%			
Grain products	73.4	74.6	74.0	67.3	65.0	66.2
Milk products	46.1	49.8	47.9	44.6	48.5	46.6
Fruits and vegetables	28.8	22.7	25.8	28.8	19.4	24.1
Meat and alternatives	18.1	25.0	21.5	15.1	21.7	18.4
Other	11.9	12.8	12.3	12.3	14.2	13.3
No breakfast	10.9	7.9	9.4	19.1	17.3	18.2

**Source:** Statistics Canada, Census at School, 2010/2011.

http://inflationdata.com/inflation/Inflation_Rate/Historical_Oil_Prices_Table.asp

8-5 Misleading Graphs

There are many ways in which data may be distorted, poorly represented, or presented in a biased form in graphs.

- Axis scale is too big or too small.
- Axis scale skips numbers, or does not start at zero.
- Axis scale made in very small units to make graph look very big.
- Scale values or labels missing from the graph.
- Incorrect scale placed on the graph. (Illogical scale spacing)
- Graph is not labeled properly.
- Graph does not have a title to explain what it is about.
- Data is left out.
- Pieces of a pie chart are not the correct sizes.
- Oversized volumes of objects that are too big for the differences they represent.
- Size of images used in pictographs being different for the different categories being graphed.
- Non-standard graph size or shape.

1. Examine the following graph found in a Vancouver newspaper.
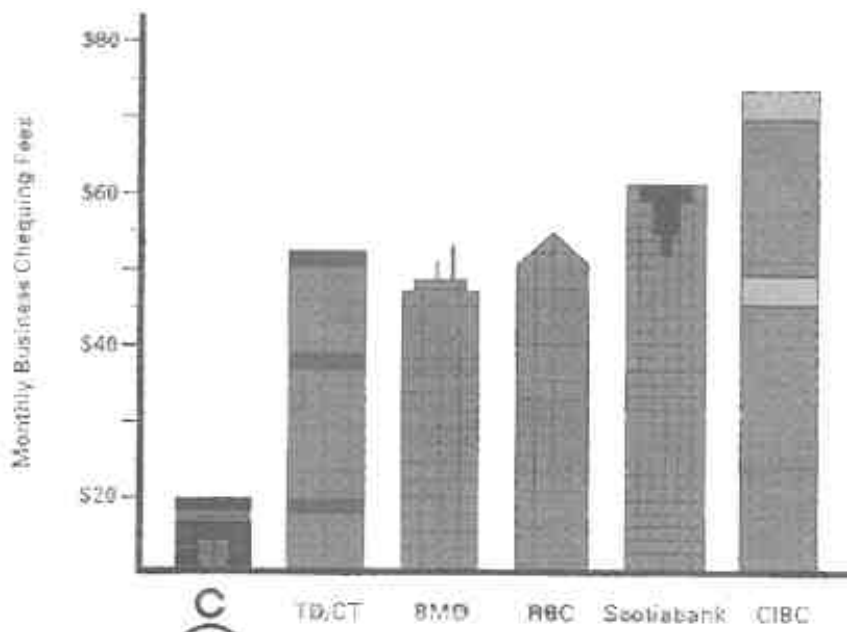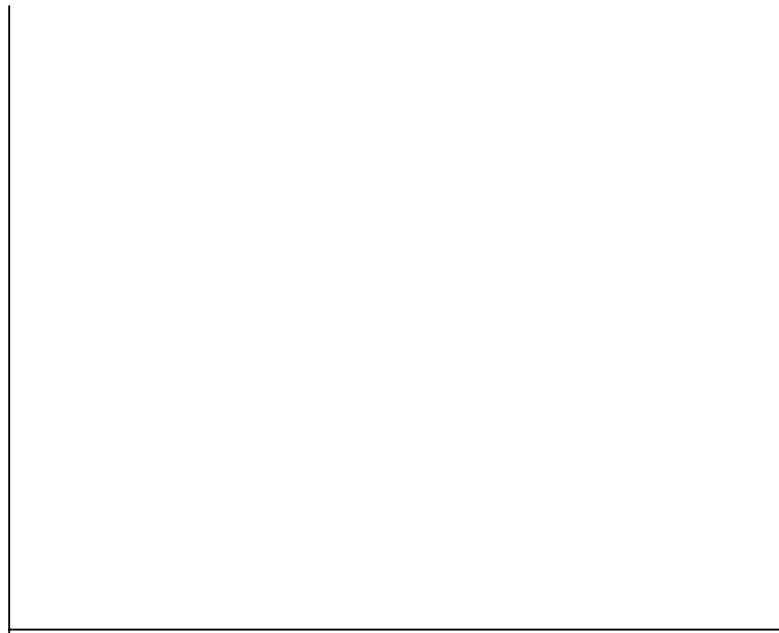
a) Explain how this graph is misleading.

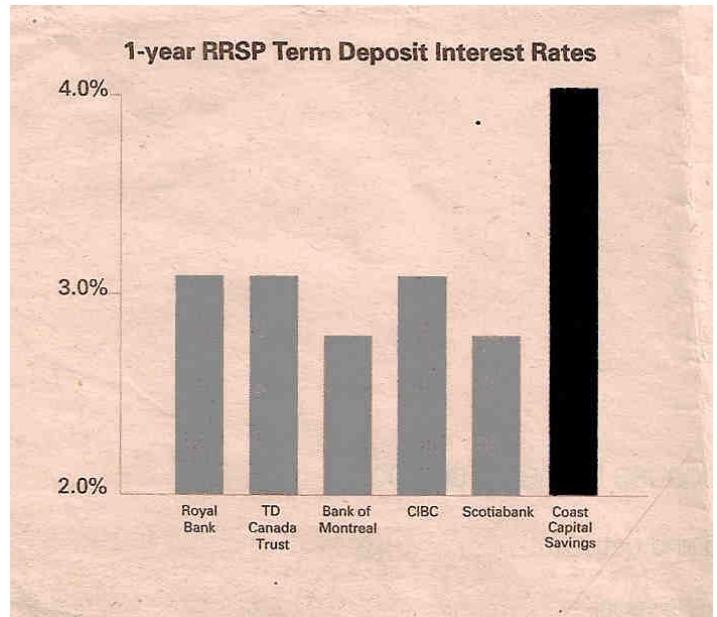b) What bank do you think made this advertisement?

c) Why would they make a graph like this?

d) Using the data from the graph, draw a new bar graph that isn't misleading.

2. Examine the following graph found in a Vancouver newspaper.

a) Explain how is this graph misleading.

1-year RRSP Term Deposit Interest Rates

b) What bank do you think made this advertisement?

c) Why would they make a graph like this?

d) Using the data from the graph, draw a new bar graph that isn't misleading.
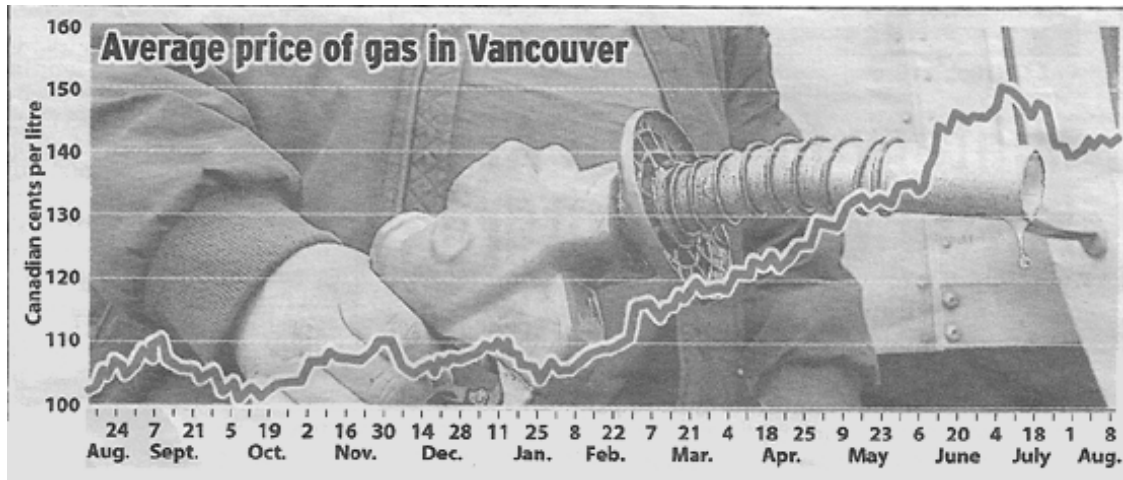
3. Provide reasons for this graph possibly being misleading. Discuss what the maker of this graph is trying to mislead you into believing.

Figure 2. Purchasing power of the Canadian dollar, 1980 to 2000

1980 = $1.00

1985 = $0.70

1990 = $0.56

1995 = $0.50

2000 = $0.46

http://www.statcan.gc.ca/edu/power-pouvoir/ch9/picto-figuratifs/5214825-eng.htm

4. Examine the following graph found in a Vancouver newspaper:

Average price of gas in Vancouver

a) Explain how this graph could be misleading.

b) Who do you think made this advertisement?

c) What are they trying to make you believe by making a graph like this?

d) Who might be very opposed to this graph?

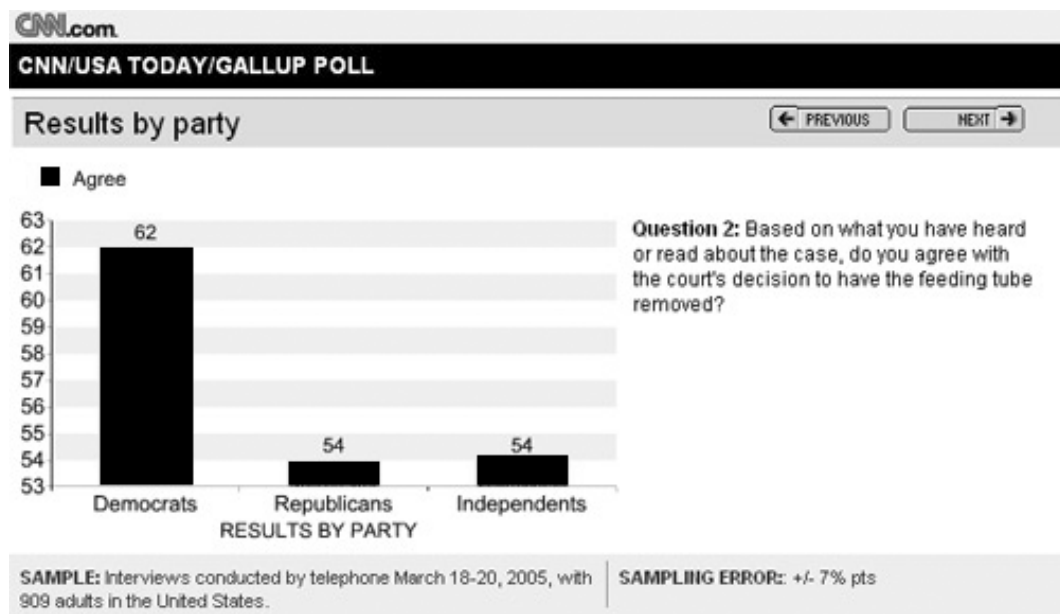e) Sketch a graph that the gas companies might put out.

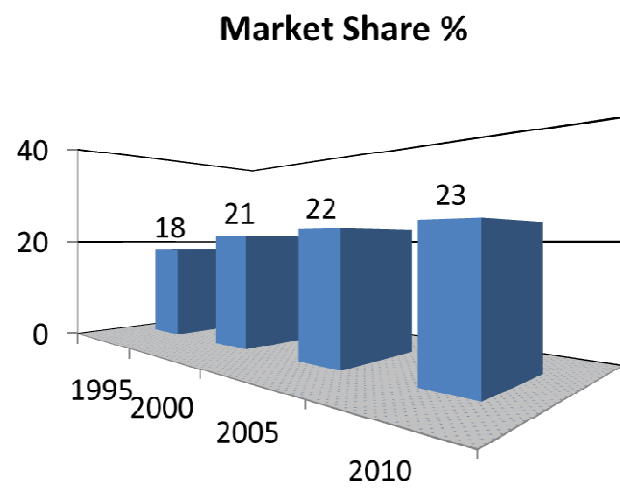f) Sketch a graph that is fair and not misleading.

For each of the following, provide reasons for the graph possibly being misleading. Discuss what the maker of this graph is trying to mislead you into believing.
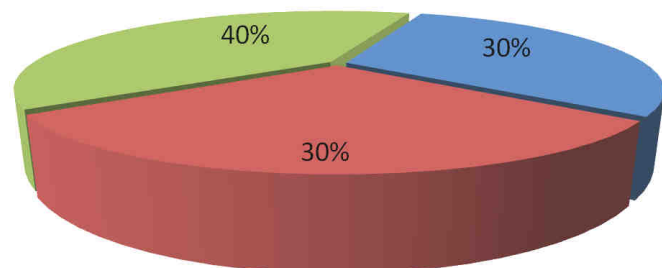
5. The following graph was taken from CNN.com:

CNN.com

CNN/USA TODAY/GALLUP POLL

Results by party   [← PREVIOUS] [NEXT →]

■ Agree

Question 2: Based on what you have heard or read about the case, do you agree with the court's decision to have the feeding tube removed?

Democrats: 62
Republicans: 54
Independents: 54

RESULTS BY PARTY

SAMPLE: Interviews conducted by telephone March 18-20, 2005, with 909 adults in the United States.

SAMPLING ERROR: +/- 7% pts

6.

Market Share %

7.

8.

293

8-6 Probability

8-6 Probability

1. A single six-sided die is rolled. Calculate the following probabilities:

a) P(4) = _____   b) P(odd number) = _____   c) P(2 or 3) = _____

d) P(less than 5) = _____   e) P(not 2) = _____   f) P(at most 6) = _____

g) P(7) = _____   h) P(at least 3) = _____   i) P(prime number) = _____

2. A single card is drawn from a standard 52 card deck. Calculate the following probabilities:

a) P(black card) = _____   b) P(diamond) = _____   c) P(King) = _____

d) P(Ace of spades) = _____   e) P(red 9) = _____   f) P(face card) = _____

g) P(not a Queen) = _____   h) P(3 or 5) = _____   i) P(spade of clubs) = _____

3. A bag contains 20 marbles, of which there are 7 black marbles, 5 red marbles, 6 green marbles, and the rest white marbles. If a marble is randomly pulled out of the bag without looking, calculate the following probabilities.

a) P(black) = _____   b) P(white) = _____   c) P(red) = _____

d) P(green or red) = _____   e) P(purple) = _____   f) P(not green) = _____

8-7 Independent Events

8-7 Independent Events

1. A six-sided die is rolled and then a coin is flipped. Draw a tree diagram to represent this experiment.

a) P(2,Heads) = _____   b) P(odd, Tails) = _____   c) P(more than 4, Heads) = _____

d) How could you have calculated these answers without drawing the tree diagram?

2. A card is drawn from a standard deck of cards, and then a six-sided die is rolled. Calculate the following probabilities:

a) P(red, 2) = _____   b) P(queen, 3) = _____   c) P(spade, 3 or 4) = _____

d) P(face card, odd) = _____   e) P(King or Ace, prime) = _____

f) P(not queen, not 6) = _____   g) P(Black Jack, at most 4) = _____

3. The Canucks have a 60% or $\frac{3}{5}$ chance of winning each game they play, independent of each other. Assume ties are not allowed.

a) Draw a tree diagram to show the possibilities for the results of the Canucks playing 3 games.

b) What is the probability that they win all 3?

c) What is the probability that they lose all 3?

d) What is the probability that they win the first two and then lose the third?

e) What is the probability that they win 2 and lose 1 (in any order)?

f) What is the probability that they lose the first game, win the second, and then lose the third?

4. Jan and Fred are playing a game called "High Card." Each player has three cards in front of him or her face down, at the same time they both flip over one card, and whoever has the highest card wins. Jan's cards are a 5, a 9, and a Queen, while Fred has a 6, an 8, and an Ace. Draw a tree diagram to show the possible outcomes of one game.

a) What is the probability Jan wins if she plays the 9?

b) What is the probability Fred wins if he plays the Ace?

c) What is the probability Fred wins if he plays the 6?

d) What is the probability Jan wins if she plays the 5?

e) What is the probability Jan wins?

f) What is the probability Fred wins?

5. A fair coin is flipped 4 times. Find the following probabilities:
a) P(exactly 1 Head)

b) P(exactly 2 Heads)

c) P(all Tails)

d) P(at least one Head)

6. On a certain chocolate bar there is a contest on the wrapper, where there is a 1 in 4 chance of winning a prize.

a) If I buy 4 chocolate bars, does that guarantee I will win a prize? Explain.

b) If I buy two chocolate bars, what is the probability that I will win a prize on the first one and not win a prize on the second one?

c) What is the probability that I will win exactly one prize if I buy 2 chocolate bars?

d) What is the probability that I will win exactly one prize if I buy 3 chocolate bars?

e) What is the probability that I will not win a prize if I buy 2 chocolate bars?

f) What is the probability that I will not win a prize if I buy 3 chocolate bars?

g) What is the probability that I will not win a prize if I buy 4 chocolate bars?

h) What is the probability that I will win at least one prize if I buy 4 chocolate bars?