Statistical Indices

Learning Goals
   - understand and use indices

Statistical Index
   - a weighted mean used to show changes over time
   - used to show trends
   - often uses 100 as a base $\longrightarrow$ *easy to use as a %*

Consumer Price Index (CPI)
   - measures price changes in consumer goods (milk,
                                        phone services...)

   - shows inflation
   - shows overall increase in price over time
   - over 600 items are used

(4.6) Understanding Indices

Gasoline Prices (¢/L)			Gas Price as Percent
	January	95.0	100
	March	93.3	98.2
2006	May	104.6	110.1
	July	109.7	115.5
	September	89.7	94.4
	November	86.5	91.1
	January	87.1	91.7
2007	March	102.4	107.8
	May	111.5	117.4

base price

This table gives the bi-monthly gas prices in cents/Litre 2006-2007.

Graph the data on the grid:

Calculate the gas price as a percent of the price in January 2006.

Ex. March '06 = $\frac{93.3}{95} \times 100\% = 98.2$

Then graph the percents on the grid in a different colour.

Compare the two graphs.
Is there information that each graph shows that the other does not? If so, what type of information?

— actual price
— how price <u>changes</u> as a %

Create a question about the increase/decrease of gas prices that could be answered using the graph of gas as a percent.

When is gas cheapest/most expensive?

When was the largest/smallest change in prices?

Price Indices

Definition:
Describes the changes compared to the base value.

Uses:
Using the changes, predict future inflation.

Examples:
Housing Market

CPI consumer price index

Consumer Price Index (CPI)

Example: Use the following CPI graph to answer the questions below.

a) *What is the base year for this CPI?*
The base year is when CPI is __100__.
That occurs in the year __2002__

b) *When was the cost of the basket of goods 110% of the base cost?*
The year __2006__.

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c) *What was the CPI in 1993? What does this mean?*

The CPI was _86_ in 1993.

This means that the cost of basket goods in 1993 was _86%_ of the base cost.

d) *Describe the change in CPI between 1990-1991. Why is this change significant?*

The CPI changed from _78_ to _83_. This is a change of _5%_

This is the _largest_ change in any _time_ period.

e) *What is the overall trend in CPI during this time frame?*

The CPI is _increasing_ overall.

This means that Canadians are spending _more_ for the same basket goods.

f) *Calculate the average annual rate of increase for CPI from 1990 to 2006.*

$$\text{annual rate of increase} = \frac{total\ increase}{number\ years} = \frac{110 - 78}{2006 - 1990} = \frac{32}{16}$$

$$= 2$$

∴ 2% increase/year

g) *Use your answer in f to predict the CPI in 2015.*

2006 ⟶ 2015 ⟹ 9 years

2006 CPI = 110

2015 110 + 18 = 128

} 9 × 2% = 18%

$$m = \frac{y_2 - y_1}{x_2 - x_1}$$

If Kendra brought a pair of shoes for $130.00 in 2002. How much would the same pair of shoes cost in 1997?

2002 CPI 100
1997 CPI 90 } −10%

Option 1

130 (0.90)

= 117

Option 2

130 (0.10) = 13
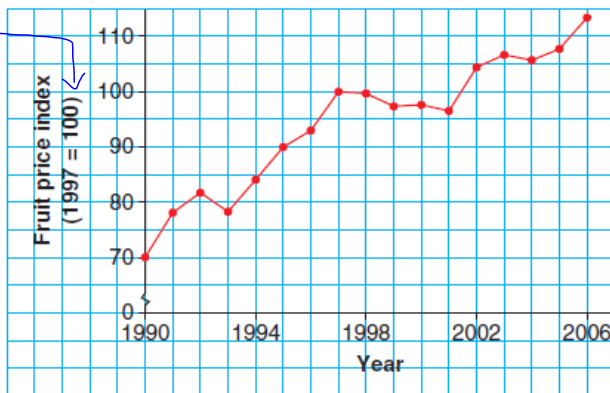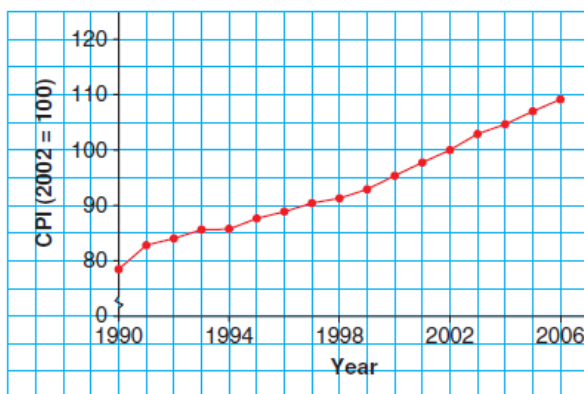
130 − 13 = 117

∴ the shoes would cost $117 in 1997.

1. a) What is this price index measuring? *change in the price of fruit*

b) What is the base year for the index? *1997*

c) Estimate the index value for each year.

   i) 1994 *84*   ii) 2002 *104*

Farm Product Price Index (FPPI) for Fruit

5. Use the Consumer Price Index graph in *Example 1* to answer these questions.

a) What was the CPI in January 1996? What does this value mean? *89*

b) What was the CPI in January 2001? What does this value mean? *98*

c) Describe the change in the CPI from January 1996 to January 2001. *9% ↑*

d) Calculate the average annual inflation rate from January 1996 to January 2001.

$$\frac{total\ increase}{\#\ of\ years} = \frac{98 - 89}{2001 - 1996} = \frac{9}{5} = 1.8$$

$$\therefore 1.8\% / year$$

2. For each price, calculate the percent price increase from a base value of $124.
Round each answer to the nearest percent.

a) $186   b) $155   c) $248   d) $131

$$\frac{186 - 124}{124}$$

25%   100%   6%
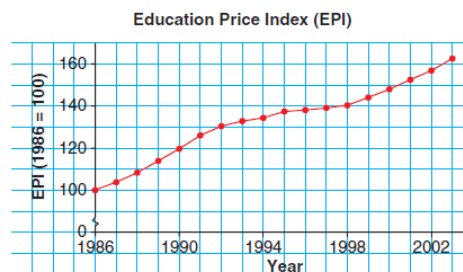
$$= \frac{62}{124}$$

$$= 50\%$$

3. For each price, calculate the percent price decrease from a base value of $124.
Round each answer to the nearest percent.

a) $92   b) $62   c) $115   d) $25

$$\frac{92 - 124}{124}$$

50%   7%   80%

$$= 26\%$$

Use this graph to answer questions 9, 10, and 11. It shows an index for government spending on education in Canada from 1986 to 2003.

Education Price Index (EPI)

9. a) What is the base year for this index? Explain how you know. 1986
   b) Estimate the EPI for each year.
      i) 1992 130   ii) 1998 140   iii) 2003 164
   c) By what percent did spending on education rise during each time period?
      i) Base year to 1992   ii) 1992 to 1998   iii) 1998 to 2003
   d) Compare your answers to part c. Which period had the greatest increase? Which period had the least increase? How does this relate to the line segments on the graph? Explain your thinking.

slope

$$\frac{130 - 100}{100}$$

$$= 30\%$$

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Seatwork

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