

Year 9 Term 2 Homework

Student Name: _____	Grade: _____
Date: _____	Score: _____

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5 Year 9 Term 2 Week 5 Homework

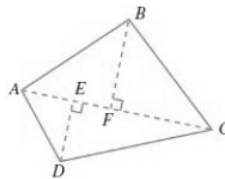
5.1 Measurement

5.1.1 Composite areas

When the figure can be subdivided into smaller figures:

- divide the figure up into standard figures.
- calculate the area of each part and add the areas.

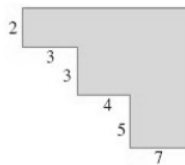
Example 5.1.1 If $AC = 15\text{ cm}$, $ED = 6\text{ cm}$ and $BF = 8\text{ cm}$, calculate the total area of the following figure.



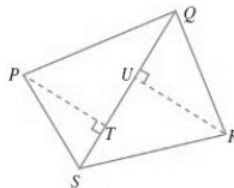
Solution: $A_1 = \frac{1}{2}BF \times AC = \frac{1}{2} \times 8 \times 15 = 60\text{ cm}^2$
 $A_2 = \frac{1}{2}DE \times AC = \frac{1}{2} \times 6 \times 15 = 45\text{ cm}^2$
 $A = A_1 + A_2 = 60 + 45 = 105\text{ cm}^2$

Exercise 5.1.1 Calculate the total area of the following figures:

1. All the measurements are in cm, find its area:



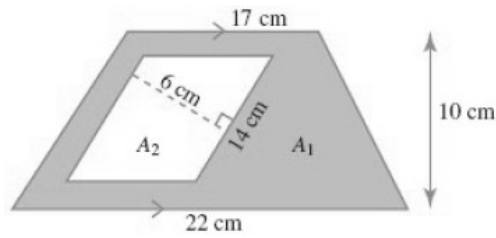
2. If $QS = 30\text{ cm}$, $PT = 17.5\text{ cm}$ and $UR = 12.3\text{ cm}$, find the area of the figure:



When the figure has been cut out from a large figure:

- Calculate the area of the large figure.
- Calculate the areas of any smaller figures that have been cut out.
- Subtract the smaller areas from the large area.

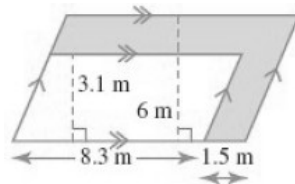
Example 5.1.2 Find the shaded area of the following figure.



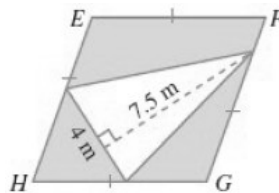
Solution: $A_1 = \frac{h}{2}(a + b) = \frac{10}{2}(17 + 22) = 195 \text{ cm}^2$
 $A_2 = bh = 14 \times 6 = 84 \text{ cm}^2$
 $A = A_1 - A_2 = 195 - 84 = 111 \text{ cm}^2$

Exercise 5.1.2 Find the shaded area in each figure.

1. Find the area of the figure shown below:

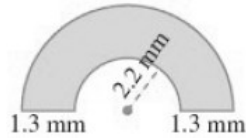


2. If $EG = 10 \text{ m}$ and $FH = 13.2 \text{ m}$, find the area of the figure:

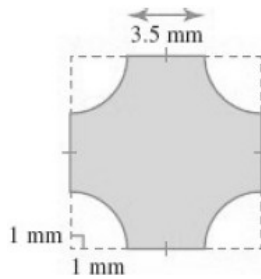


Exercise 5.1.3 Determine the shaded area in each of these figures, correct to 2 decimal places.

1. Area = _____



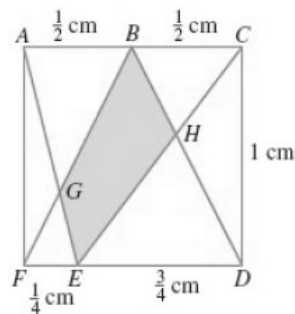
2. Area = _____



3. Area = _____



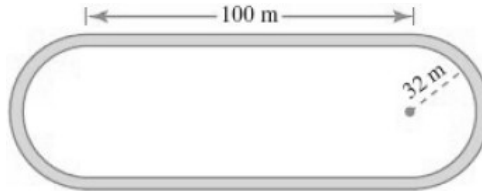
4. Area = _____



5.1.2 Problems involving area

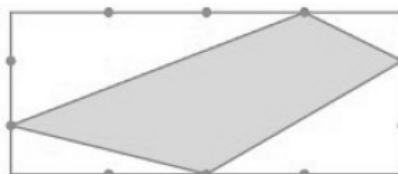
Exercise 5.1.4

1. A 6 m wide running track consists of two straight sections each 100 m long and a semicircular section at each end and the inner radius of 32 m. Find the area of the running track, correct to the nearest square metre.



2. A roundabout is to be constructed at a busy road intersection. It is to have a diameter of 4.5 m and the road around it is to be 5.4 m wide. Calculate the area of the road, not including the roundabout. (answer correct to 1 decimal place)

3. What fraction of this rectangle has been shaded?



5.2 Data representation and analysis

5.2.1 Graphs

Graphs are used to represent both numerical and categorical data in a way that makes the data easier to understand and analyse.

- A **column graph** consists of a number of vertical columns, which may be either separated or joined.
- A **bar graph** is a column graph that has been drawn on its side.
- A **divided bar graph** consists of a large rectangle divided into smaller rectangles. The lengths of the small rectangles are in proportion on the sizes of the sizes of the categories.
- A **line graph** is usually used to compare two sets of numerical data.
- A **picture graph** is a simple version of a bar graph.
- A **sector graph** or **pie chart** consists of a circle that has been divided into sectors. The sizes of the sectors are in proportion to the sizes of the categories.
- A **radar chart** is used to plot changes in quantities, such as temperature or water level over a period of time.

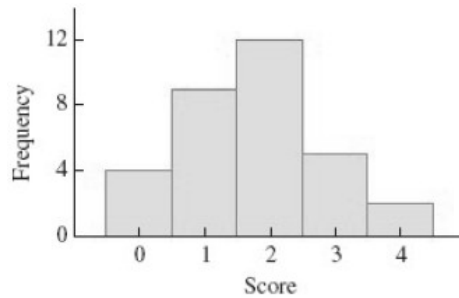
5.2.2 Organising data

Once data has been collected, it must be organised into a table or graph so that it can be analysed.

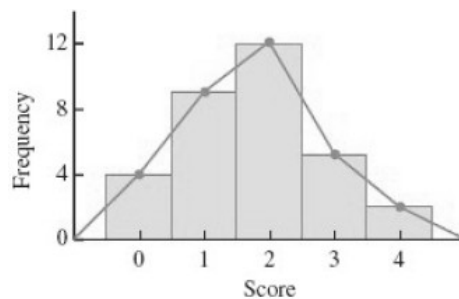
- The frequency distribution table:
 - the scores are placed in the left-hand column
 - a tally column may be used to enter the scores one at a time
 - the frequency indicates the number of times that each score occurs.

Score	Tally	Frequency
0	IIII	4
1	IIII III	9
2	IIII III II	12
3	IIII	5
4	II	2
$\Sigma f =$		32

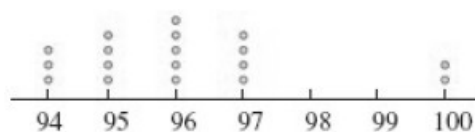
- The frequency histogram is a type of column graph:
 - the scores are placed on the horizontal axis
 - the frequencies are shown on the vertical axis
 - the columns straddle the scores and are drawn next to each other without a gap
 - a space of half the width of one column is left before the first column.



- The frequency polygon is a type of line graph:
 - the scores are placed in the horizontal axis
 - the frequencies are shown on the vertical axis
 - the first score is marked on full unit away from vertical axis.



- The dot plot is a simplified version of the histogram:
 - the scores are placed along a horizontal line
 - one dot is placed above the score in a vertical line each time that score occurs.
 - both the clusters and outliers can be easily identified.



- The stem and leaf plot is similar to a histogram that has been drawn on its side:
 - the first part of each score is called stem
 - the remaining part of the number is called leaf
 - a large number of scores can be written in class intervals of 5.
 - back-to-back stem-and-leaf plot can be used for two groups of similar data.

				Males	Females
				9 8 5 3 2	1 4 7 8
				8 7 7 6 4 3 1 2	2 0 2 5 5 6 7
2	8 9	7 ⁽⁰⁾	0 1 4	9 7 6 6 5 4 4 4 3	3 1 3 4 4 7 8 9
3	2 5 6 8	7 ⁽⁵⁾	5 7 7 8	7 5 5 4 3 2 0	4 2 3 5 6 6 6 7 8 8
4	4 7 8	8 ⁽⁰⁾	0 1 2 3 4	9 7 6 4 1 1	5 0 0 1 1 4 5 5 7 7 8
5	1 3	8 ⁽⁵⁾	7 9	5 5 3 2	6 1 2 3 5 6

Exercise 5.2.1 A computer store manager drew this radar chart to compare the performance of his salespeople. The graph shows the number of computers sold during May by each employee.



1. How many computers were sold by Harriet?

2. Who sold 28 computers?

3. Who sold the most computers and who sold the least?

4. How many more computers did Allan sell than Max?

5.2.3 Analysing Data

- The **mean** is the sum of the scores divided by the number of scores:

- The symbol for the mean is \bar{x} .
- The definition of the mean can also be written using the Greek letter Σ :

$$\bar{x} = \frac{\sum x}{n}$$

where \bar{x} is the mean, $\sum x$ is the sum of the score, n is the number of scores.

- The mean from a frequency distribution table is given by:

$$\bar{x} = \frac{\sum fx}{\sum f}$$

where \bar{x} is the mean, $\sum fx$ is the sum of the scores, $\sum f$ is the number of scores.

- The **median** is the number in the middle:

If a set of scores have been arrange in ascending order:

- the median is the the middle score if there are an odd number of scores
- the median is the average of the two middle scores if there are an even number of scores

When a set of **n** scores have been arranged in a ascending order, the median is:

- the $(\frac{n+1}{2})$ the score in **n** is odd
- the average of the $(\frac{n}{2})$ and the $(\frac{n}{2} + 1)$ the scores if **n** is even.

- The **mode** is the the score with the highest frequency.

- To find the mean of a large number of multiple scores using a calculator (fx-100AU) :

- Set the calculator to statistics mode (SD) **MODE** **MODE** **1**
- Clear the statistics memory by pressing **SHIFT** **CLR** **1**
- Enter multiple scores by pressing **score** **×** **frequency** **M+**
(or **score** **SHIFT** **'** **frequency** **M+**)
- repeat this until all the scores have been entered
- Press **SHIFT** **2** **1**

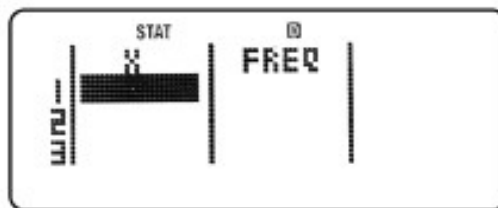
5.2.4 Find the mean from a frequency table

The calculator can be used to calculate the mean from a frequency table.

Example 5.2.1 Use the calculator to find the mean of the given frequency table:

Score	1	2	3	4	5
Frequency	2	5	6	4	1

- Press **MODE** **2** (for stats)
- Press **1**
- Press **SHIFT** **MODE**
- Press the **Down Arrow** on the **REPLAY** button then press **3**
- Press **1** (for frequency on)
the display should look like this.



- Now press **1** **=** **2** **=** **3** **=** **4** **=** **5** **=**
- Now put frequency by moving the cursor to the Freq column
- Add each frequency followed by **=**
- Press **AC** then
- Press **SHIFT** **1** **5** **2** **=** and the display should read 2.833333333

Exercise 5.2.2 Use your calculator to find the mean and median of each set of scores, correct to 2 decimal places.

<i>Score</i>	1	2	3	4	5
<i>Frequency</i>	5	7	8	12	5

mean = _____ , median = _____

<i>Score</i>	10	11	12	13	14	15
<i>Frequency</i>	2	4	5	10	8	4

mean = _____ , median = _____

Exercise 5.2.3 The stem and leaf plot shows the half year maths exam marks out of 40 for a class of Year 9 students.

<i>Stem</i>	<i>Leaf</i>
1 ⁽⁵⁾	3 4
2 ⁽⁰⁾	2 2 3 4 4
2 ⁽⁵⁾	5 6 8 8 8 8 9
3 ⁽⁰⁾	2 3 4 4 4 4
3 ⁽⁵⁾	5 6 6 7 7 8 8

1. How many students are in the class?

2. What is the mean?

3. What is the median and mode?

4. How many students scored less than 50%?

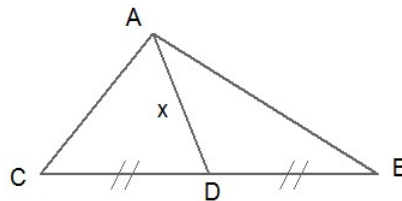
5.3 Math challenge

Exercise 5.3.1

1. Evaluate $1996 \times 19981998 - 1998 \times 19961995$ without using a calculator.

2. Evaluate $(654321)(654321) - (654323)(654319)$ without using a calculator.

3. The figure shows a triangle ABC with $AB = 9$ and $AC = 4$. If D is the mid-point of BC and $AD = x$, Find all the possible integers of x .



4. Let $x = \frac{\sqrt{10}-1}{2}$. Find the value of $4x^2 + 4x + 1000$.
