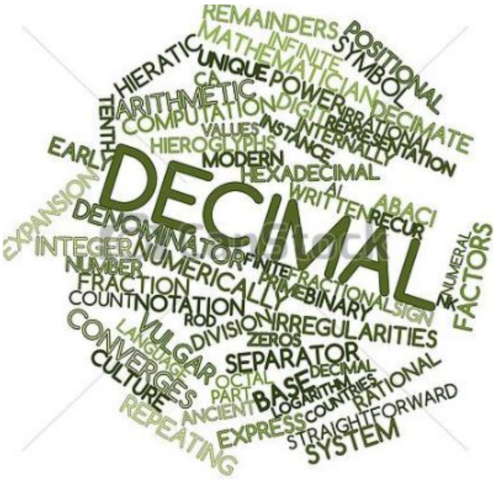
Week 4
Term 1
2023

HAWKER COLLEGE

Engage | Inspire | Achieve

EM1
Calculations, percentages and rates



Goals

Goals for this week:

- check results of calculations for accuracy
- recognise the significance of a place value after the decimal point
- evaluate decimal fractions to the required number of decimal places
- round up or round down numbers to the required number of decimal places
- apply approximation strategies for calculations

Theoretical Components

STEP 1

Resources:
PDF file: Week 4 Notes and Exercises
YouTube videos:
https://www.youtube.com/watch?v=_ARhxT5WyWc&ab_channel=SmithMathAcademy

This Week:
We will be looking at:

- Truncating and rounding
- Using multiples in measurement
- Using decimals in time

Practical Components

STEP 2
Read through Week 4 Notes and Exercises for instructions on what to do.

There are 4 Exercises in this booklet. Read any worked examples before you begin.

If you haven't completed the work from last week, you need to complete it and hand it in.

Remember to regularly check Google Classroom for messages.

Portfolio Task

STEP 3

Complete the task at the end of the brief and submit your weekly work. ☺

Other

Remember to check Google Classroom or hawkermaths.com for each week's learning brief

Make sure you have joined the Google Classroom. If you have not, see your teacher.


Estimations
jar 1 =
jar 2 =
jar 3 =
jar 4 =
jar 5 =

ESSENTIAL MATHEMATICS 1

WEEK 4 – FURTHER ESTIMATION

How are we ever going to use this?

- Mentally estimating the amount we have to pay and the change we should receive.
- Estimating the total value of shopping to make sure we have sufficient funds to pay for it.
- Trades people use multiples frequently when they calculate material quantities.

ROUND IT OR CUT IT OFF

When we use a calculator to solve a problem, we often have lots of numbers after, or to the right, of the decimal point. When this happens we have a choice, should we chop off the numbers after the decimal point or round them in some way? We call chopping off a decimal *truncating*. When businesses calculate their GST instalments, the tax office allows them to truncate any cents in the final amount.

When we round off, we can round to a specific level e.g. to 1 decimal place or to the nearest 5c but in practical situations we often have to round up or round down to the nearest whole number.

For example, if you calculate that you need 4.3 tins of paint to cover your living room wall, you will have to buy 5 tins of paint as the store will not supply 0.3 tins of paint. This is an example of rounding up.

Example:
For the decimal 24.891

a. Truncate
b. Round up to the nearest whole number (or integer)
c. Round down to the nearest whole number (or integer)

Solution:

a. Truncate means ‘cut off’. We simply leave off the decimal part. Thus, truncated 24.891 is 24.
b. When we ‘round up’ we go to the next whole number. Thus, 24.891 rounds up to 25.
c. When we ‘round down’ we go to the nearest smaller whole number. Thus, 24.891 rounds down to 24.

In Australia, the 5c coin is the smallest coin in circulation. Thus, the total cash price for items bought has to be rounded to the nearest 5c. All final cash prices now end in 5c, or a multiple of 10c.

Price of items	Cash price
$28.61	$28.60
$28.62	$28.60
$28.63	$28.65
$28.64	$28.65
$28.65	$28.65
$28.66	$28.65
$28.67	$28.65
$28.68	$28.70
$28.69	$28.70

Example: Billy bought several items in a supermarket and the bill came to $23.58. How much will he have to pay for the items if he pays cash?

Solution: Cash prices round to the nearest 5c. We need to decide whether $23.58 is closer to $23.55 or $23.60. It is 2c from $23.60 and 3c from $23.55. It is closer to $23.60 so Billy will pay $23.60.

Exercise 1

1. Express the number 42.375
    a. Truncated

    b. Rounded up to the nearest integer

    c. Rounded down to the nearest integer

2. Round each amount up to the nearest integer.
   a. 631.32 b. 189.95 c. 54.55 d. 73.23

3. Round each amount down to the nearest integer.
   a. 46.8 b. 32.75 c. 821.79 d. 6.43

4. Dallas calculated she needed 18.2 bags of mulch for her garden. How many bags should she buy?

5. Cash prices are rounded to the nearest 5c. What is the cash price for each item?
   a. $2.87 b. $3.57 c. $5.98

6. Brett bought a bag of fruit priced at $7.78 and he paid with a $10 note. How much change should he receive?

7. Jessica sells boxes of eggs from her hens. Each box contains 12 eggs. How many boxes can she fill with 80 eggs?

8. At lunchtime, Romeo bought a can of drink marked at \$2.38 and a bread roll priced at \$3.28 from the local shop. He was charged \$5.70 for his purchases: \$2.40 for the drink and \$3.30 for the roll. Was Romeo charged the correct amount? Give reasons for your answer.

ROUNDING DECIMALS

Rounding decimals to 1 decimal place is very similar to rounding to the nearest whole number, but the practical method used to determine the number is a little different. When you are rounding a number to 1 decimal place, look at the number in the second decimal place. If this number is 5 or bigger, round up. If it is less than 5, round down. Watch the YouTube video on the cover sheet if you are confused.

Example:

a. Express 15.382 correct to 1 decimal place.
b. Round 174.834 correct to 1 decimal place.
c. What is the measurement 6.7523 m correct to 1 decimal place?

Solution:

a. The second decimal place is 8, which is greater than 5. Thus, we round up. The 3 becomes a 4 which makes the answer 15.4.
b. The second decimal place is 3, which is less than 5. Thus, we round down. The 8 stays as 8, which makes the answer 174.8.
c. The second decimal place is 5, thus we round up. The 7 becomes 8 which makes the answer 6.8 m.

Exercise 2

1. Round each number to 1 decimal place.
    a. 17.81   b. 52.79   c. 123.65   d. 3.45

    e. 12.1867   f. 23.449   g. 75.55   h. 61.94999

2. Use a calculator to evaluate the following expressions and write each answer correct to 1 decimal place. Remember to use the correct order of operations – you may need more than one step.
    a. $6.72+19.35-4.772$ b. $27.31+16.72\times7.6$ c. $75\div5.6+3\times2.55$

3. Nelson bought 79.3 L of petrol at 191.9 c/L
    a. Explain why the value 80×2 will give the approximate cost of the petrol in dollars.

b. Approximately how much will the petrol cost?

c. Use a calculator to determine the cost of petrol correct to the nearest 5c.

d. How much different is your approximation to the actual cost?

PRACTICAL MULTIPLES

Nuts and bolts can come in packets of 20 or 100, fertiliser in 40 kg bags and printed material in lots of 1000. Many manufacturers package material in multiple quantities for use by trades people, and in most cases, it is not possible to buy part of a packet.

Example: Anna is starting a dog walking business and animal minding service. She is getting some advertising pamphlets printed. The printer handles advertising pamphlets only in multiples of 250. Anna wants 600 pamphlets. How many does she have to buy?

Solution: Multiples of 250 means ‘lots of 250’. The multiples of 250 are: 1×250, 2×250, 3×250, 4×250, 5×250, etc. The first five multiples are 250, 500, 750, 1000, 1250, etc. Anna can’t order 600 pamphlets because 600 isn’t a multiple of 250. Anna will have to order 750 pamphlets if she requires 600 pamphlets.

Exercise 3

1. Business envelopes come in boxes of 200.
   a. At the end of each month, Jane posts accounts to all the company's customers. She ordered eight boxes of envelopes for the letters. How many envelopes are contained in the boxes Jane ordered?

   b. Mike requires 600 envelopes to post statements to customers. How many boxes of envelopes will he need?

   c. What are the first four multiples of 200?

   d. Joel needs 840 envelopes. How many boxes does he need to order?

2. At the wholesaler where Rachel buys her electrical supplies, electrical wire is available only in multiples of 100 m. Rachel calculated that to finish her next job she will need three 74 m lengths of wire and two 180 m lengths. How much wire does she need for the job?

   Write down some multiples of 100 first.

3. Darren is making a fence from treated pine. The wood is available in lengths that are in multiples of 300 mm from 2.1 m to 3 m. He needs 17 posts each 1.35 m long and eight top rails each 2.3 m long. He wants to buy the smallest amount of timber possible. What timber should he order from the timberyard? (Write down the available timber lengths first).

4. The school is buying some folders for the Essential Mathematics course. The folders are available for $12 a pack. Each pack has 20 folders. There are 110 students enrolled in the course. How many packs does the school need to buy and how much will it cost?

5. Jane goes shopping for poppers (juice boxes). She would like to buy enough poppers for a school semester when it goes on sale for 2 packs for $8. Each pack has 6 poppers. How many poppers will she need and how much will it cost her?

AFTER THE POINT

While 1.5 always means one and a half, 1.5 hours does not mean 1 hour and 5 minutes, neither does 1.5 years mean 1 year and 5 months. In these situations, we have to think for ourselves.

Example: What does the .45 mean in the following situations?

a. \$16.45
b. 16.45 m

Solution:

a. When dealing with money, the decimals represent cents. Thus, the .45 means 45c.
b. When dealing with a measurement in metres, the first two decimals represent centimetres. Thus, the .45 means 45 cm.

Example:

a. Write 1.7 hours in hours and minutes.
b. Express 1.6 months in months and days.

Solution:

a. There are 60 minutes in an hour. If we multiply the .7 by 60, we will get the number of minutes.
   $60 \times 0.7 = 42$ Thus, 1.7 hours is 1 hour and 42 minutes.
b. There are 30 or 31 days in a month. We need to multiply .6 by 30 or 31.
   $30 \times .6 = 18$ and $31 \times .6 = 18.6$. Thus, 1.6 months is approximately 1 month and 18 days.

Exercise 4

1. What does the .24 represent in the following amounts?
   a. \$7.24 b. 7.24 m

2. What does the .9 represent in the following measurements?
   a. \$18.90 b. 18.9 m

3. Convert the following to hours and minutes.
    a. 2.5 hours   b. 3.8 hours   c. 2.9 hours

4. Follow these steps to convert 4.5 years into years and months
    a. How many months are there in one year?
    b. Multiply this number by .5
    c. Write 4.5 years in years and months.

5. Convert 2.25 years into years and months.

6. Express each time in months and days. Assume there are 30 days in a month and write your answer correct to the nearest day.
   a. 6.5 months

   b. 8.9 months

   c. 3.24 months

7. The progress of a game of cricket can be measured in ‘overs’. An over consists of 6 balls.
   a. Express 18 balls in overs.

   b. During a test match the commentator said “There are 18.5 overs remaining until the end of play.” If the commentator was using mathematics correctly, how many overs and balls should be remaining?

   c. The commentator meant that there were 18 overs and 5 balls remaining. Why do you think cricket commentators use decimal points in this non-standard way?

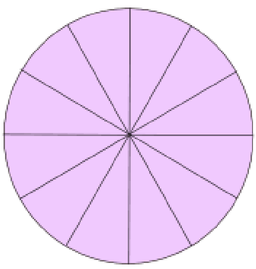
Week 4 Portfolio Task

This week, we are going to approximate π (pi).
https://www.mathsisfun.com/activity/pi-approximation.html

Firstly, use a calculator to find an approximation for the value of π. Write down the number your calculator gives, probably to 8 or 9 decimal places. Now, round that answer to 3 decimal places:

Next, you will need:

- A piece of card or thick paper
- A pair of compasses and a pencil
- A protractor
- A ruler
- A pair of scissors
- Glue and another piece of paper (use the end of the notes)



Step 1

Draw a circle on your card. The exact size doesn't matter, but let's use a radius of **5 cm** (centimetres).

Use your protractor to divide the circle up into twelve equal sectors.

What is the angle for each sector? That's easy – just divide 360° (one complete turn) by 12:

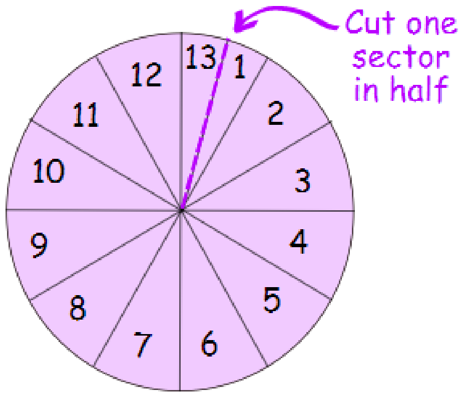
$360° / 12 = 30°$

So each of the angles must be 30°

Step 2

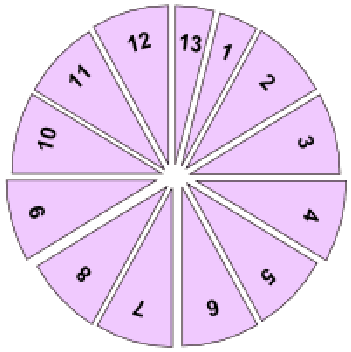
Divide just one of the sectors into two equal parts – that's 15° for each sector.

You now have thirteen sectors – number them 1 to 13:



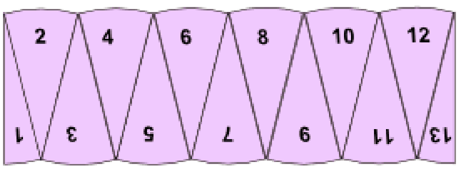
Step 3

Cut out the thirteen sectors using the scissors:

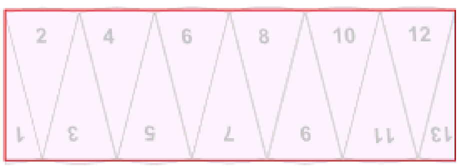


Step4

Rearrange the 13 sectors like this (you can glue them onto a piece of paper):



Now that shape resembles a rectangle:



Step 5

What are the (approximate) height and width of the rectangle?

- Its **height** is the circle's **radius**: just look at sectors 1 and 13 above. When they are in the circle they are "radius" high.

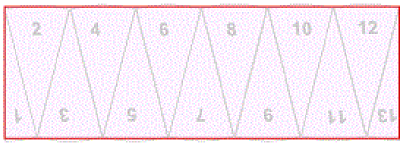
- Its **width** (actually one "bumpy" edge), is half of the curved parts around the circle ... in other words it is about **half the circumference** of the original circle. We know that:

  Circumference = 2 × **π** × radius

  And so the width is:

  Half the Circumference = **π** × radius

And so we have (approximately):



radius

π × radius

With a radius of **5 cm**, the rectangle **should be**:

- 5 cm high
- about 5**π** cm wide

Step 6

Measure the actual length of your "rectangle" as accurately as you can using your ruler.

Divide by the radius (5 cm) to get an approximation for **π**

Put your answer here:

Rectangle Length (in cm with one decimal place accuracy)	Divide by 5 cm $\approx \pi$

Stick your rectangle here:

Remember π is approximately 3.141592654…
How good was your answer?

Explain how you could get an even better (more accurate) approximation for π (pi).

MARKING RUBRIC

CRITERIA	EXPECTATIONS	POSS	MULT	GIVEN	TOTAL
Practical	Student completes practical work, including exercises of the brief to an acceptable standard set by the teacher.	**2**	**3**		**/6**
Portfolio Task	Student completes the portfolio task of the week to an acceptable standard set by the teacher.	**2**	**2**		**/4**
Reasoning and Communications	Student responses are **accurate** and appropriate in presentation of mathematical ideas, with **clear** and logical **working out** shown.	**4**	**-**		**/4**
Concepts and Techniques	Student submitted work selects and applies **appropriate** mathematical modelling and **problem solving techniques** to solve practical problems, and demonstrates **proficiency** in the use of **mathematical facts, techniques** and **formulae**	**4**	**-**		**/4**
	Submission Guidelines				
Timeliness	Student submits the exercises and portfolio tasks by the set deadline. See scoring guidelines for specific details.	**2**	**-**		**/2**
		FINAL			**/20**

Student Reflection:
How did you go with this week's work?

What was interesting?

What did you find easy?

What do you need to work on?