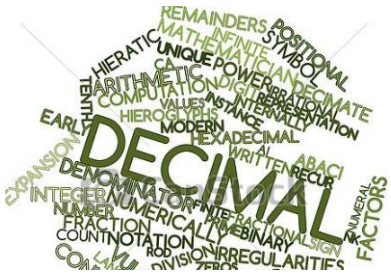
Week 4
Term 1
2021

HAWKER COLLEGE
Engage | Inspire | Achieve

EM1 Learning Brief: Calculations

Goals



This week's goals:

- check results of calculations for accuracy (EMA06)
- recognise the significance of place value after the decimal point (EMA07)
- evaluate decimal fractions to the required number of decimal places (EMA08)
- round up or round down numbers to the required number of decimal places (EMA09)
- apply approximation strategies for calculations (EMA10)

Theoretical Components

STEP 1

Resources:
PDF file: Follow through the Week 4 notes, complete all parts.
YouTube Videos:
https://www.youtube.com/watch?v=_ARhxT5WyWc

Knowledge Checklist:
(this list all the concepts you should have done this week)

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

Order
(don't know where to start… follow this order)

1. Complete the Week 4 notes.
2. Complete the activity at the end of the notes
3. Get it all checked and signed off by your teacher

Practical Components

STEP 2

There are 4 Exercises to complete from the *Week 4 Notes and Exercises*

Investigation/Written Task

STEP 3

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

QFO

Quiz/Forum/Other

DECIMALS

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 of accuracy eg 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 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 Bill will pay $23.60.

Exercise 1

Q1. Express the number 42.375

a) truncated
b) rounded up to the nearest integer
c) rounded down to the nearest integer

Q2. Round each amount up to the nearest integer.
a) 631.32 b) 189.95 c) 64.55 d) 73.23

Q3. Round each amount down to the nearest integer.
a) 46.8 b) 32.75 c) 821.79 d) 6.43

Q4. Dallas calculated she needed 18.2 bags of mulch for her garden. How many bags should she buy?

Q5. Cash prices are rounded to the nearest 5c. What is the cash price for each item?
a) $2.87 b) $3.54 c) $2.93

Q6. Brett bought a bag of fruit priced at $5.78 and he paid with a $10 note. How much change should he have received?

Q7. Jessica sells boxes of eggs from her hens. Each box contains 12 eggs. How many boxes can she fill with 80 eggs?

Q8. At lunchtime, Roberto bought a can of drink marked at $1.38 and a bread roll priced at $1.18 from the local shop. He was charged $2.60 for his purchases: $1.40 for the drink and $1.20 for the roll. Was Roberto charged the correct amount? Give reasons for your answer.

ROUNDING MEASUREMENTS

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 less than 5, round down.

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 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.

Exercise 2

Q1. 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

Q2. Use a calculator to evaluate the following expressions and write each answer correct to 1 decimal place. Remember to use the correct order of operation – you may need more than one step.

a) 6.72 + 19.35 - 4.772 b) 27.31 + 16.72 × 7.6 c) 75 ÷ 5.6 + 3 × 2.55

Q3. Nelson bought 79.3 L of petrol at 155.8 c/L

a) Explain why the value of 80 × 1.5 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 40kg bags and printed material in lots of 1000. Many manufacturers package material in multiple quantities for use by tradespeople, 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

Q1. 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?

Q2. At the wholesaler where Kelly buys her electrical supplies, electrical wire is available only in multiples of 100m. Kelly calculated that to finish her next job she will need three 74m lengths of wire and two 180m lengths. How much wire does she need for the job?

Write down some multiples of 100 first.

Q3. Darryl is making a fence from treated pine. The wood is available lengths that are multiples 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 some multiples of 300 mm first.

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, in this case, the .45 means 45 cm.

Example

Write 1.7 hours in hours and minutes.

Solution

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.

Example

Express 1.6 months in months and days.

Solution

There are 30 or 31 days in a month. We need to multiply .6 by 30 or 31.

30 × .6 = 18 and 31 × .6 = 18.6 thus 1.6 months is approximately 1 month and 18 days.

Exercise 4

Q1. What does the .24 represent in the following amounts?

a) $7.24 b) 7.24 m

Q2. What does the .9 represent in the following measurements?

a) $18.9 b) 18.9 m

Q3. Convert the following to hours and minutes.

a) 2.5 h b) 3.8 h c) 2.9 h

Q4. 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.

Q5. Convert 2.25 years into years and months.

Q6. Express each time in months and days. Assume there are 30 days in a month and write your answers correct to the nearest day.

a) 6.5 months

b) 8.9 months

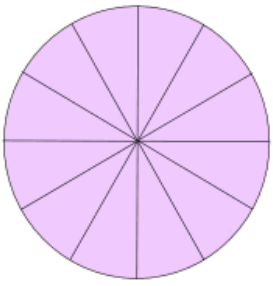
c) 3.24 months

Week 4 **Portfolio Task** **Name:**

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:

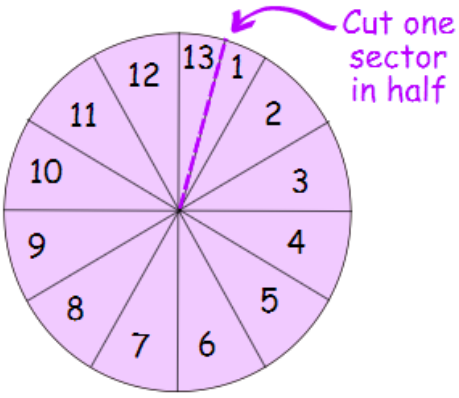
360° / 12 = 30°

So each of the angles must be 30°

Step 2

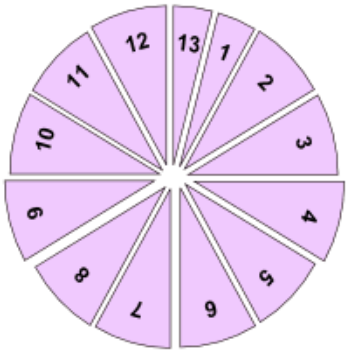
Divide just one of the sectors into two equal parts – that's 15° for each sector.

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



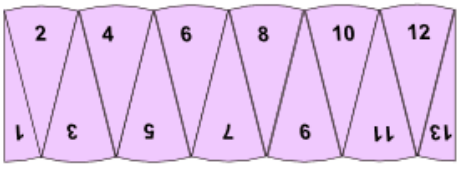
Step 3

Cut out the thirteen sectors using the scissors:

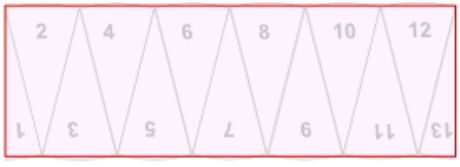


Step4

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?

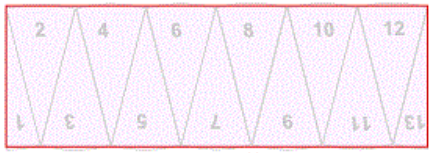
- Its **height** is the circle's **radius**: just look at sectors 1 and 13 above. When they are in the circle they are "radius" high.
- Its **width** (actually one "bumpy" edge), is half of the curved parts around the circle ... in other words it is about **half the circumference** of the original circle. 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 ≈ π

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 **Week 4** **Name:**

CRITERIA	EXPECTATIONS	POSS	MULT	GIVEN	TOTAL
Practical	Student completes practical work, including exercises and Mathspace task, of the brief to an acceptable standard set by the teacher.	**2**	**3**		**/6**
Portfolio Task	Student completes the portfolio task of the brief to an acceptable standard set by the teacher.	**2**	**2**		**/4**
Reasoning and Communication	Student responses are accurate and appropriate in presentation of mathematical ideas in different contexts, 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, Mathspace task and portfolio 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?