NATIONAL MATHEMATICS PROGRAMME

MEASURMENT RESOURCE BOOKLET

FOR GRADE THREE TEACHERS

Learning Activity I – In a Minute

Just a minute!

Have students stand quietly beside their seat. Say "Go" and then use a clock, watch, or stopwatch to measure exactly one minute. When students think one minute is up, they should quietly sit. At the end of the activity, identify those students who sat closest to the 60-second mark.

Try the activity again. Have students remain seated. This time, ask them to quietly stand when they think exactly one minute has passed.

Have students repeat the activity in pairs or groups of three, timing one another. Have each student take several turns and record the results. (*How many actual seconds had passed when each student indicated a minute was up?*) Which students seem to have the best concept of a minute?

A minute to memorize!

Give students a list of 10 *grade-appropriate* math words to alphabetize. (*You may use words associated with the topic, Measurement.*) When the time begins, they write a 1 next to the word that comes first in alphabetical order, a 2 next to the word that comes second, and so on. How many students accomplished the task in one minute?

Write 10 *grade-appropriate* words on a chart. Give students one minute to look over the words. Then cover the chart. Give them **1 minute** to write down as many of the words as they can remember. Which student(s) remembered the most words?

Given a sheet of simple addition math facts problems (*for example, 4 + 3 and 6+5*), how many problems can students solve in exactly 1 minute? (*You might try subtraction or multiplication facts to see how students do with those compared to addition facts.*)

***Endure for a minute!* (The PE Test)**

Engaging in activities 1 and 2 may lead students to recognize how quickly a minute can pass. However, a minute can seem to pass slowly during a test of physical endurance. For instance, have students stand on one foot with both hands raised above their heads for exactly one minute, or have them remain in the up position of a push-up for exactly one minute. Does a minute *feel* longer during some activities than it does during others?

Assessment Activity I – Schedule of Favourite Television Programmes

Allow students to complete a schedule of selected favourite television programmes over a period of one week. The table below presents an example of possible television programmes. Allow students to complete the table as they see fit.

TV Programme	Start time (in words)	Ends	Elapsed time
Avatar	Thirty minutes past 7 in the evening ***Or*** Half past seven in the evening	8:00 p.m.	30 minutes
Scooby-Doo		9:50 a.m.	50 minutes
Sponge Bob			
Back at the Barnyard			

Schedule of My Favourite Television Programmes

TV Programme	Start time (in words)	Ends	Elapsed time

TIME-O

T	I	M	E	O

T I M E O

Instructions:

1 Give each student a blank "*Time-O*" Card.

2 Write a list of 25 or 30 different times on the board (*digital times*)

6:45	2:00	8:00	9:00	7:00
10:00	11:20	12:10	3:45	8:15
12:30	1:00	1:15	1:30	1:45
3:15	2:30	5:15	7:45	9:30
4: 55	4:00	4:30	4:45	5:20
5: 10	6:00	6:30	6:45	3:00

3. Students select at random times from the list, and then write a different time in each square on their "*Time-O*" card.

6. The teacher will use a large analogue clock at the front of the room to adjust the hands so they show one of the times on the chart/board.
7. Students who have written that time on their "Time-O" card will cross it off or place a chip on top of the time.
8. The first player to cover (or cross out) five times in a row calls out ***"TIME-O!"*** and wins the game.
9. The winner might lead the next round of the game.

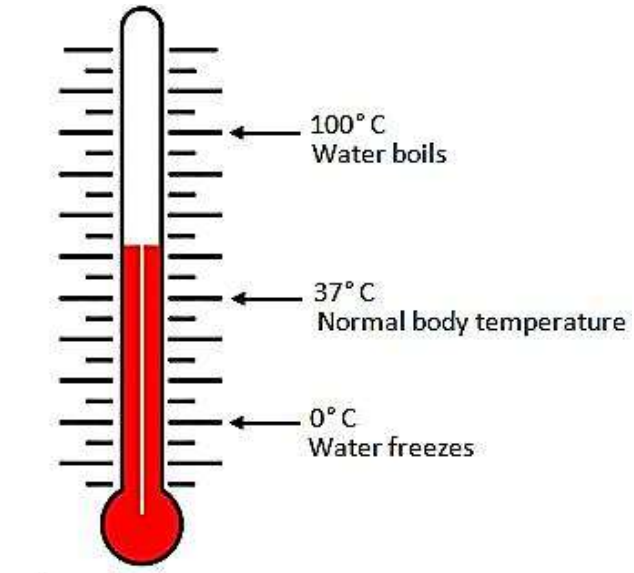
NOTE:

1. It may be useful to keep a running list of the times you have shown.
2. Ensure that you check the winning student's card to be certain that all the times covered were among the times you showed on the clock.

T	I	M	E	O

T
I
M
E
O

Learning Activity II- Temperature Estimation



Celsius Thermometer

Allow students to use their knowledge of the temperatures of boiling point and freezing point and normal body temperature to estimate temperatures on the Celsius thermometer in the following contexts:

1. Janet loves to swim. The air outside would be about as warm as her body. She plans to wear her swimsuit. How warm would it be outside to enjoy swimming?
   a. 60^0C
   b. 35^0C
   c. 20^0C

2. I'm really thirsty. I would like some hot *milo*. What is the temperature of my hot *milo*?

   It is warmer than my body
   It is not boiling
   I don't want it to burn my mouth.
   a. 60^0C
   b. 40^0C
   c. 20^0C

3. It is almost time for a shower. What will the temperature of the water be?
   a. 80^0C
   b. 45^0C
   c. 30^0C

Birthday Cakes

When Jack was one year old his mother bought a packet of 24 candles for his birthday cake.

That year she put 1 candle on Jack's cake. When he was two he had 2 candles and when he was three he had 3 candles, and so on.

One day Jack's little sister Kate was born. She had 1 candle on her first birthday cake, 2 candles on her second birthday cake, and so on.

The candles were finished on one of Jack's birthdays with just enough left.

How old was Jack when Kate was born? And how old was each of them when the candles finally ran out?

CALCULATE AGE IN YEARS AND MONTHS

Engage in a discussion to determine students' birth dates, their ages and how they are able to know their ages. Encourage them to share how they would be able to tell their ages in Years *and Months*. Have students demonstrate their suggested strategies and have others test to see if they can use these methods to find their own age in Years and Months.

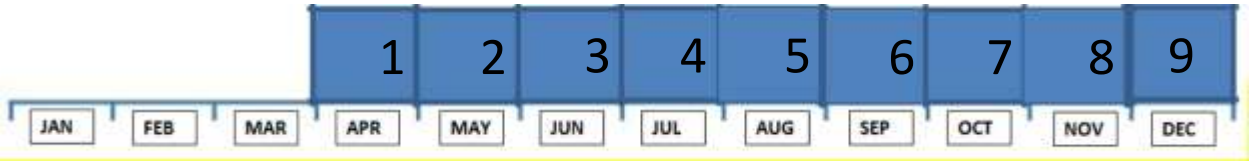
Suggest to students that there is yet another way, and that they can work in pairs to investigate their ages.

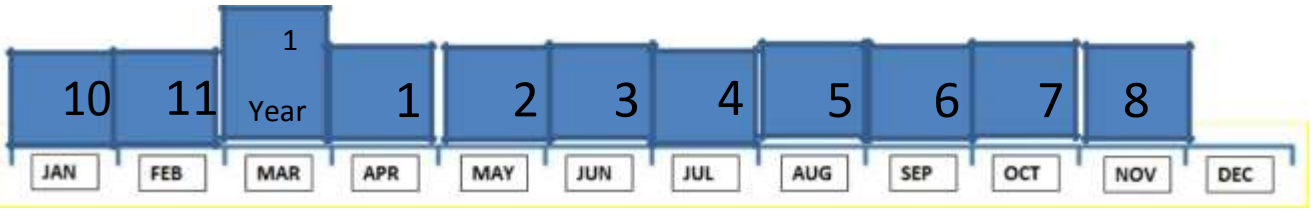
Introduce them to the task 'How Old Are You?' Each pair of students should be given a set of Year strips and a set of Number cards up to 100. A sample of the strips and the number cards are below. They can be duplicated and printed.

Give each group their kit and instruct them to determine the number of Year strips that they think they will need.

Do a demonstration using a very young child. For example, the child was born March 2014, how old is he now (Nov 2015)? Use the board for your demonstration. Your demonstration pieces will be large for all the students to view from the board.

Firstly, get a Year strip and begin populating it with number cards. Since the cards represent months, which month would be the first month? Guide students in seeing that the child becomes one month old – one month later – which is in April. Also, get them to decide on the number of strips needed for the exercise. Since the child was born in 2014, two strips will be needed; one for 2014 and one for this year 2015. Begin populating.

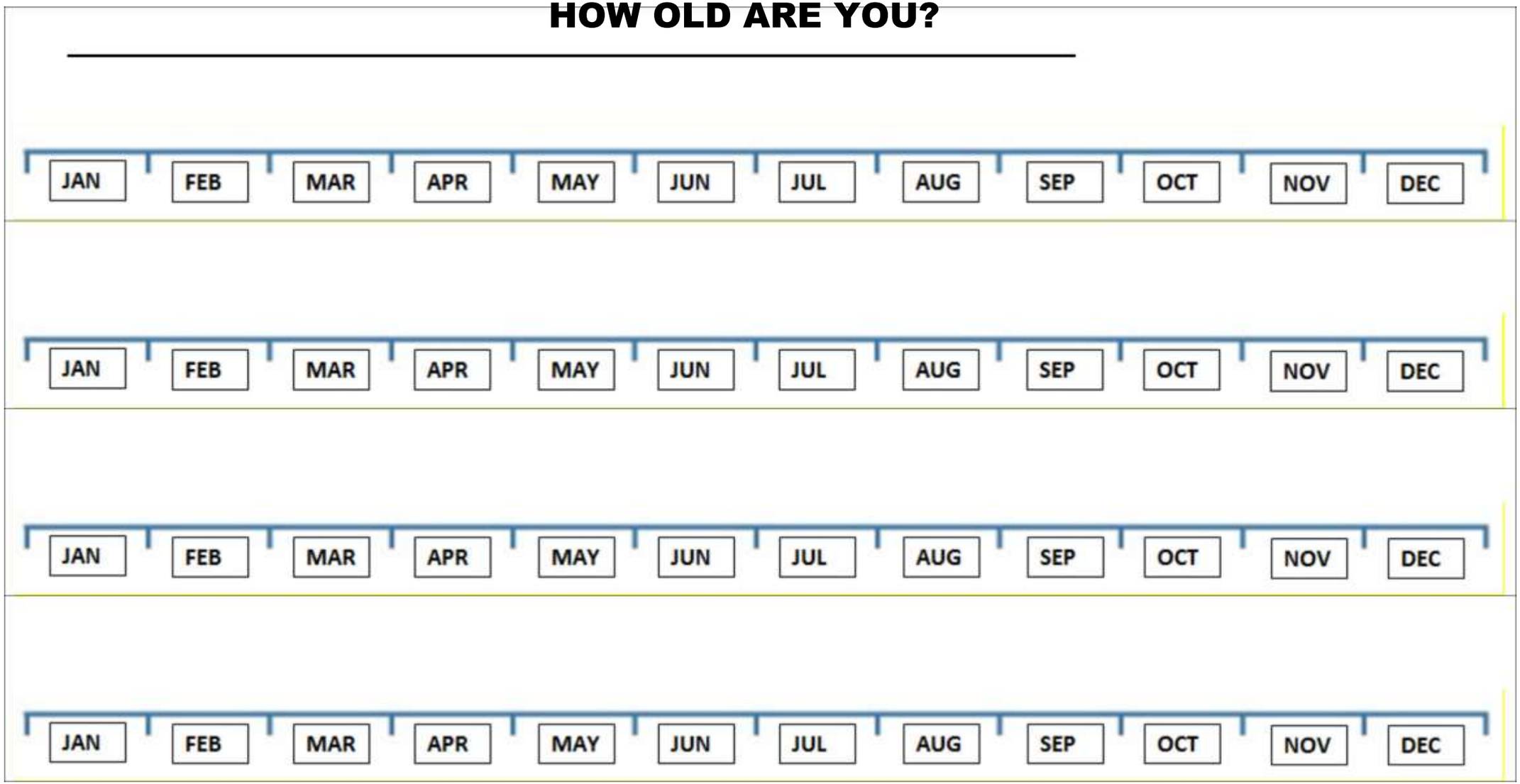


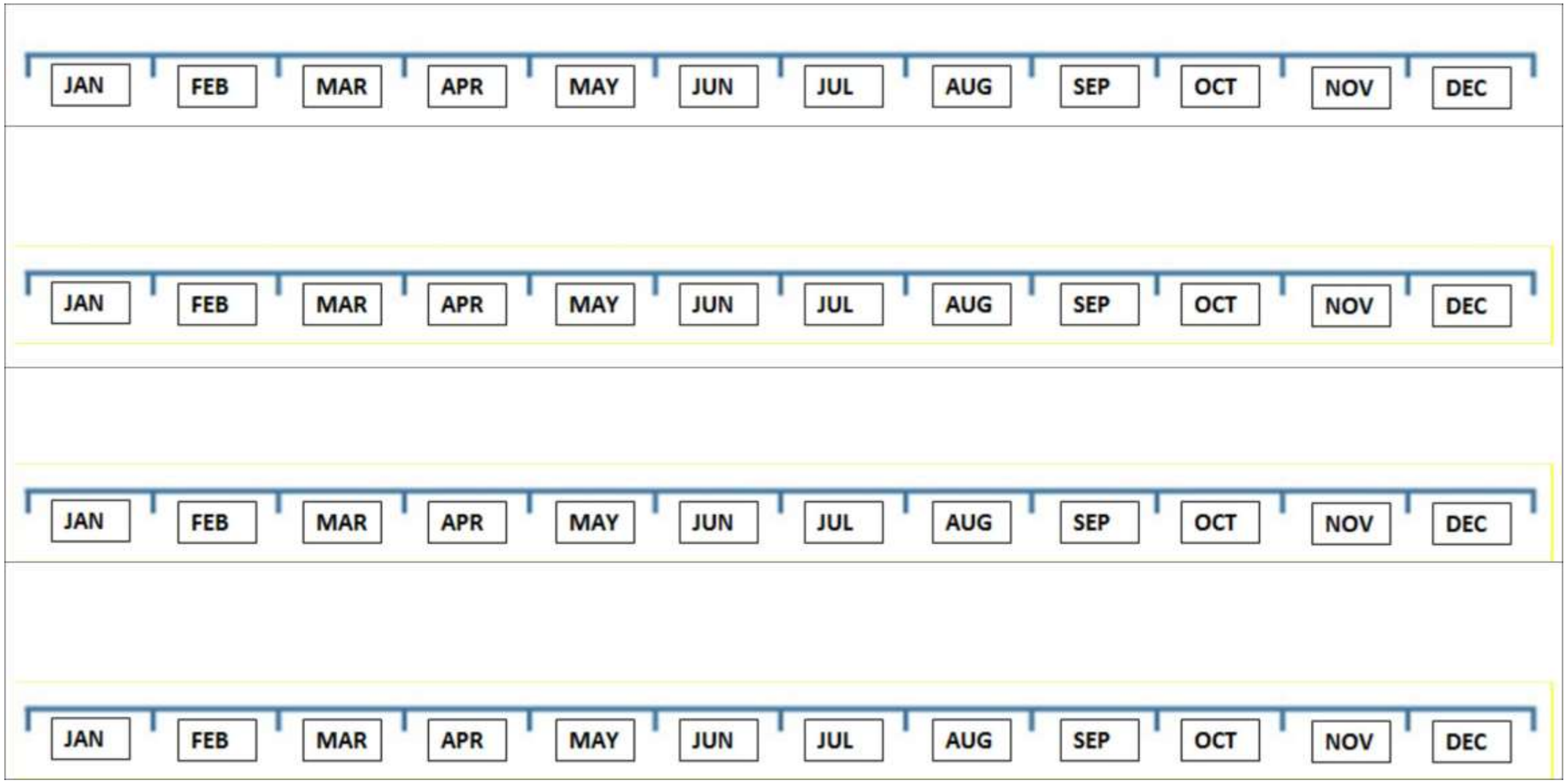


The child is 1 year and 8 months

HOW OLD ARE YOU?

_____




JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC
JAN FEB MAR APR MAY JUN JUL AUG SEP OCT NOV DEC

1	2	3	4	5	6	7	8	9	10
11									
1 YEAR	2 YEARS	3 YEARS	4 YEARS	5 YEARS	6 YEARS	7 YEARS	8 YEARS	9 YEARS	10 YEARS

Establishing reference for 1km / Measure for 1km

Allow students to use reference of 100m to develop familiarity with a distance of 1km for example along a 100m stretch on the playing field.

1. Have the students walk a distance of 100 m and record the time that it takes them to walk this distance.
2. Engage students in a discussion to ascertain from them the metric unit they would use to measure the distance from their home to school or to the nearest town centre.

   Guiding questions

   a. *What do you think would happen if you use a metre rule to measure this distance?*
   b. *Would metre be the most suitable unit for measuring distances along roadways? Explain your answer.*
   c. *What metric unit of measuring length do you think they use to measure these large distances along roadways?*
   d. *How far do you think you will have to walk in order to cover a distance of 1km?*
   e. *Based on what you know, what do you think is the best way for knowing how far is 1km*

3. Plan and take students on a '1 kilometre walk' and have them estimate and then measure how long it takes them to walk this distance. (An alternative could be to have students identify a distance of 100 metres on the school grounds and walking this distance 10 times. Have the students time the walk.)
4. Have the students recording the estimated as well as the actual time it takes to walk the distance of 1km as well as identify any local landmarks for the distance covered.

My One kilometre (1km) Walk		
Estimated time	**Actual time**	**Landmarks**

Create a drawing in the space provided below to show the distance you walked and some of the buildings/places you passed.
About how many metres do you think you walked? Explain.

Sample questions for reinforcing the students' developing sense of the size of a kilometre.

- *Why do we need the unit of km?*
- *What kinds of things are measured in kilometres?*
- *How can we measure 1km? What is the easiest way?*
- *Why does it take me less time than John to walk 1km?*
- *How many metres are in 1 kilometre?*

Differentiating among centimetre, metre and kilometre

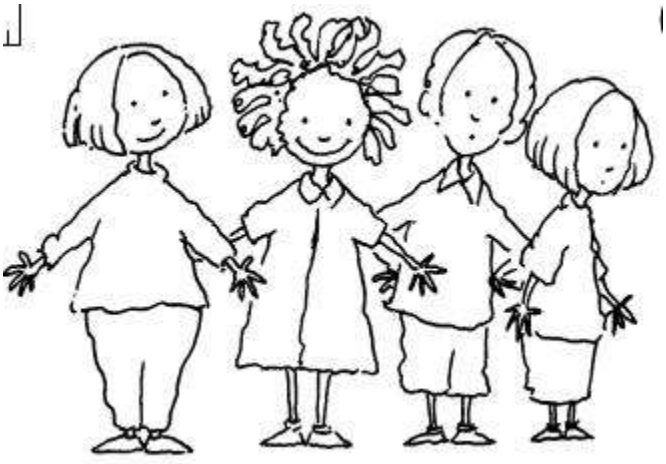
Review students' familiarity with the unit of measure by engaging them in a discourse about the approximate sizes of each of the following units as well as their appropriateness for use in a variety of measuring situation.

- *centimetre*
- *metre*
- *kilometre*

Sample Guiding Questions

- *Was the centimetre or the metre strip appropriate for measuring all of the given objects? Explain your answer.*
- *Which objects was the cm strip not appropriate for measuring and why?*
- *Which objects was the m strip not appropriate for measuring and why?*
- *Explain how would you decide on the most suitable metric units of length for measuring a given object?*

Sample Problem SolvingTask



Four students, Nicky, Kelly, Gene and Tami, were measuring the distance between two points in a variety of measuring situations. They were using metres, centimetres and kilometres only. Nicky's distances involved measuring objects that were longer than Kelly's but not as long as Tami's. Gene's distances were 100 times longer than Tami's. Make a list of 5 possible objects that each student measured and the units they used?

Objective: Tell or show time on the clock
-using intervals

1. Allow students to make a water clock like the one in the diagram. (***N.B. The size of the container and the hole made at the bottom of the container will affect the way your clock measures time.)***

2. Allow students to estimate the time it will take for the water level to drop from one mark to the next on their water clock and record their results in the table below.

water moves down	estimated time taken	measured time taken
1 mark		
2 marks		
3 marks		
4 marks		

3. Allow students to measure the time taken for the water level to drop from one mark to the next on their clock and record their results in the table above.

4. Engage students in a discussion about their water clocks and the way it measures time.

Guiding Questions:

3 What do you think would happen if the marks were further apart?
4 What do you think would happen if the marks were closer together?
5 If your water level fell by _____ marks in one minute, how many marks will it fall in 5 minutes?
6 How could you make your clock measure 5 minutes accurately?
7 Name an activity you could complete in 5 minutes.

Extension Activity

If your water clock dropped down *x* marks in 5 minutes, how many marks will it drop down in 10 minutes, 15 minutes etc.

Using Unifix Cubes or coloured counters to connect groups of five to minutes on the clock face

4. Give each student five connected Unifix cubes and point to children as you go around the room.
5. Have the students counting by fives with you.
6. Then give each student a cut-out of five connected Unifix cubes and repeat the counting by fives.
7. Have a student tape his cut-out cubes to the board placed horizontally.
8. Draw a vertical line segment at the right end of the set of cut-out cubes.
9. Engage the students in a discussion about the number of cubes and the number of groups of five cubes placed on the board.

   Guiding Questions:

   - How many groups of five cubes are on the board?
   - How many cubes are on the board and write the 5 above the line segment.
   - Count the horizontal cubes and write the numeral above them.
10. Have other students add their cubes to the horizontal number line one at a time.
11. Have the students report both the number of groups of five cubes and the total number of cubes.
    (Notice that the number of groups of cubes is the same as the number of students who have put up their cubes.)
12. Once the number line is complete, have the class discuss the two sets of numbers and how they are connected.

    Guiding Questions:

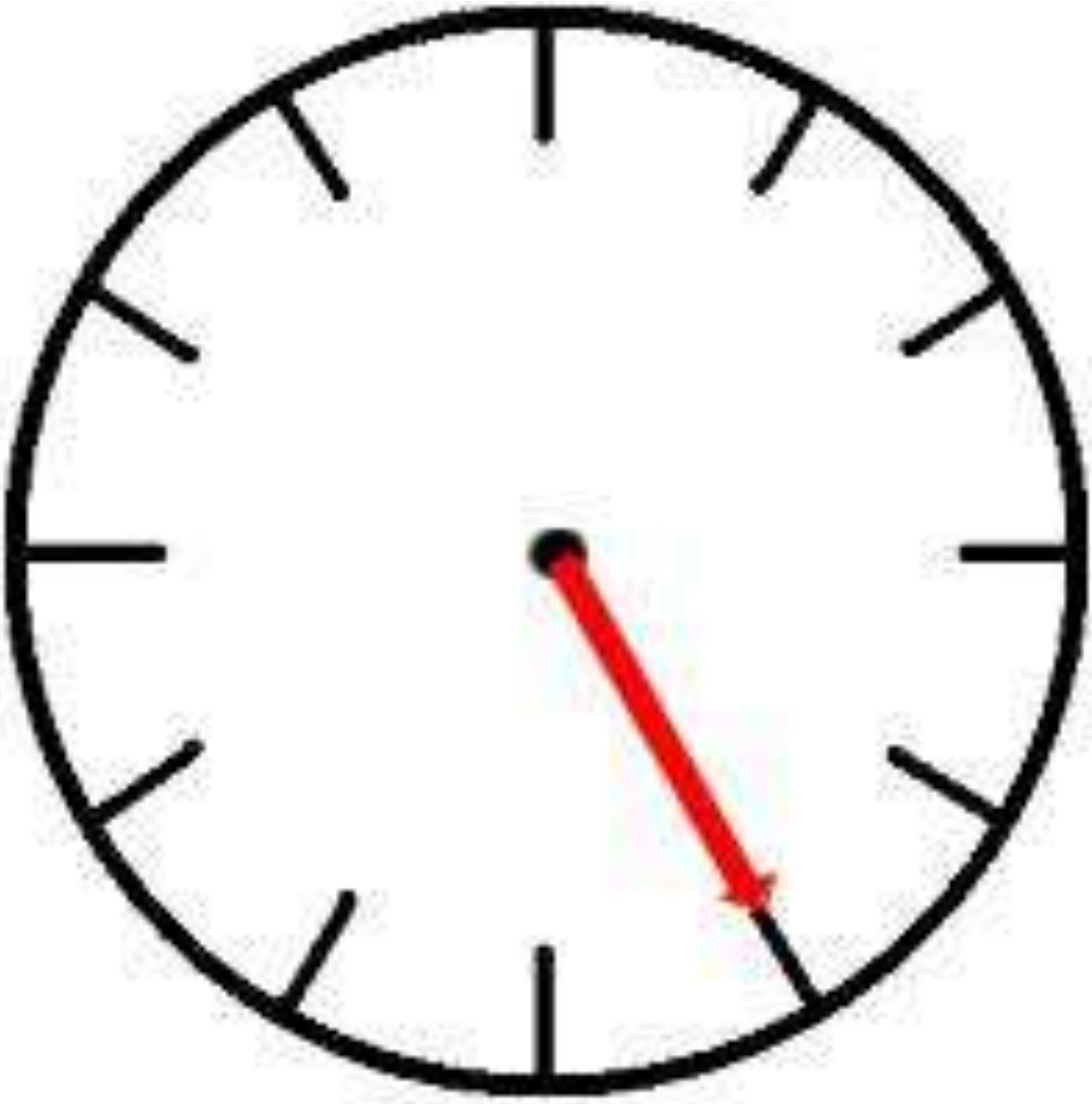
    How many groups of five cubes make thirty-five cubes?
    How many numerals are on the face of a clock?
13. Remove the section of the cube number line beyond twelve groups of five.
14. Have the class discuss whether or not they could use their cube number line to tell time.
15. Have students rearrange the sections of the cube number line into an approximation of a round clock face.
16. Have students label the round clock face with both sets of numbers, keeping the total number of cubes on the outside of the circle.
17. Place a clock without numbers on the board next to the cube clock face.
18. Engage students in a discussion about the face of the clock

    Guiding Questions

    - What do you think the strokes represent?
    - What number do you think this stroke represents*? (Pointing to the stroke representing 60 minutes ?*
    - What number do you think this stroke represents? (*Pointing to the stroke representing .....35 minutes)*

19. Allow students to use one handed clocks to determine how many minutes have passed and justify their responses.

For example: On the clock below, 25 minutes have past or it is 25 minutes past the hour.



Objective: Tell or show Time on the clock
- using the format minutes to/minutes.

10. Begin with a one-handed clock (hour hand only) and allow students to review time on the hour and the half by engaging them in a discussion about what time the clock is showing. Encourage them to use approximate language. For example:

It is about 7 o'clock."

"It is a little past 9 o'clock."

"It is half-way between 2 o'clock and 3 o'clock"

3. Engage students in a discussion about what happens to the short hand as the long hand moves from one hour to the next. For example: When the short hand is pointing at the 12, the long hand is pointing exactly to a number.

<u>Guiding Questions</u>

If the short hand is about halfway between two numbers, where would the long hand be?
If the short hand is a bit before or after a number, where would the long hand be?

2. Use two real clocks, one with only an hour hand and one with two hands. (Break off the minute hand from an old clock.) Engage them in a discussion about the time in approximate language. Cover the two- handed clock periodically during the day and direct students' attention to the one-handed clock. Have students predict where the minute hand should be. Uncover the other clock and check.

3. Allow students to investigate and discover that there is a 5 to 1 relationship between the numbers indicating the hours on the clock and the strokes indicating the minutes. (***See diagram of number line and clock on page 6).***

4. Allow students to record the matching number for hours and minutes each time.

5. Allow students to count by fives going around the clock.

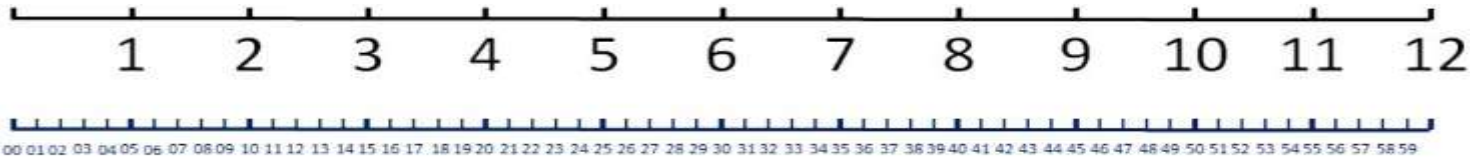
6. Allow students to predict how many minutes after the hour, for example: It is about 20 minutes after the hour. (***As skills develop, suggest that students always look first at the hour hand to learn approximately what time it is and then focus on the minute hand for precision.***)

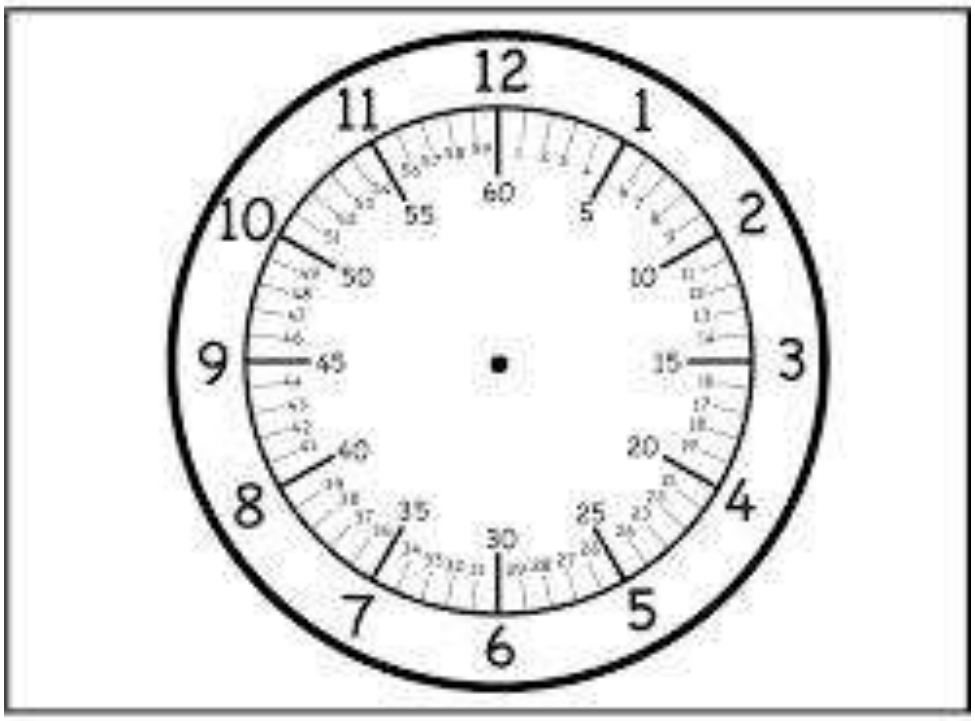
1. Allow students to predict the reading on a digital clock when shown an analogue clock, and vice versa; set an analogue clock when shown a digital clock. This can be done with both one-handed and two-handed clocks.

Adopted from Van de Walle, J. A. (2004). Elementary and Middle School Mathematics: Teaching Developmentally. Boston: Pearson. Chapter 19, pages 341 – 2.

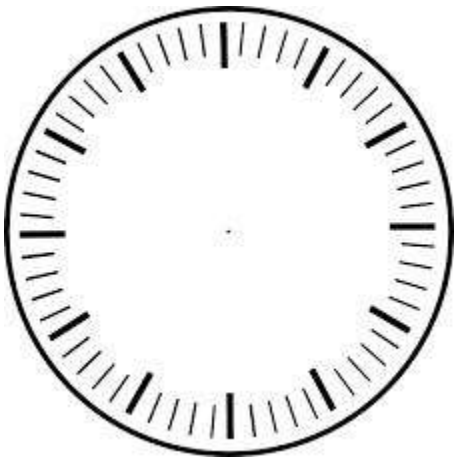
Objective: Investigate the relationship between minute and hour

c. Introduce a number line which contains the numerals one through twelve. Bend the number line into a circle to resemble a clock face.





2. Provide a worksheet with a large circle and ask the students to place the numerals inside the circle to make a clock face. According to the ability of the group, you may wish to place some marks on the circle to facilitate spacing of the numbers. For example:



5. Review that the minute hand points to the twelve, while the hour hand indicates the hour. Provide a worksheet with clocks that have no hands on them. Underneath each clock, write a time in the "o'clock" form. Have the students draw in the minute and hour hands to show the correct time. ***(See worksheet)***

6. Have each student make a paper plate clock face. Using a brad fastener, attach tag board or construction paper hands to the center of the plate. These clocks can then be used in various reinforcement activities. For example, as the teacher calls out a time, the students show the correct time on their clocks. This activity can be adapted to a team game. Divide the classroom into teams. When the teacher calls a time, the first person to correctly display his/her clock gains a point for his/her team. Take the Time Quiz.

Other suggested Activities

1. . Play "Time Tic-Tac-Toe." Prepare blank tic-tac-toe grids and duplicate these for the students. Print Grid and have students write in times on the hour. (The degree of difficulty can be adapted as the students' progress.) Display a clock showing a time. If the student has that time written on his/her game board, he/she may cover it with a marker. The first person to complete a row horizontally, vertically or diagonally wins.

2. Write times to the hour from 1 o'clock to 12 o'clock on index cards and a number from 1 to 12 on a tag board square. Place the numbers 1-12 in a large circle to form a clock face.

Children sit around the clock. Give 12 children each a time card to keep facedown. Two volunteers, one taller than the other, stand in the centre of the clock.

Guiding Questions:

5. Who should be the minute hand? Why? (The taller child because the minute hand is the long hand.)
6. Where should the taller child point to show 1 o'clock? (to 12)
7. Where should the shorter child point? (to 1)

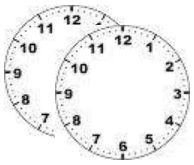
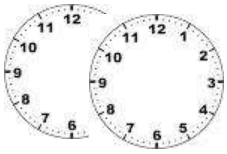
Children take turns holding up their index cards. Students tell where the children representing the hands should point to show that time. Repeat the activity until all children have a turn to show the time.

Problem Solving for Time # 1

A clock loses 5 minutes every hour. If the clock is set at the start of the school day, what activity is likely to be happening when it has gained 20 minutes? Explain.

Problem Solving for Time # 2

Allow students to draw the hands on the clock to show the given starting times and then use the information in the table below to plan a schedule so that he/she can attend each event.

School Activities	Starting Times	
Mathematics Quiz Competition 	Five minutes past 11:00 O'clock	Half past 12:00noon
Devotion 	Ten minutes to 7:00 o' clock	Ten minutes past 12:00 noon
Math Club 	Twenty-five minutes past 1:00pm	Twenty minutes past 12:00

Schedule: _____ _____

_____ _____

_____ _____

MEASUREMENT: LITRE AND MILILITRE

Objective: Investigate the relationship between millilitre and litre

Student would compare items/objects estimating which would hold the most liquid.

- Which bottle would hold the most Juice? Why?
- Which bottle holds the least amount of juice? Why?

Objective: Estimate, measure and record capacity of various containers in litre or millilitres

Students will be given the following chart where they will be asked to complete the table. If the containers are filled with liquid which unit of measure would be likely used millilitre or litre? They should then explain in their note books why they have chosen that unit of measure and their reason for their estimation of the container's capacity.

(Teacher may add his/her images of choice to the chart)

Items	What will it be measured in Litre or Millilitre	Estimate how much Litre or Millilitre it would hold
		
		
		

objective: Investigate the relationship between millilitre and litre

Mother goes to the supermarket to buy a tin of grape juice. Both tins cost the same. Mother wants more for money. Which should she buy? Explain why.