Tutor Guide

Application of Number Level 3

Unit 2: Measurement and capacity

| Activity | Identifying Shapes | Code M1 |

This activity links to **award learning outcomes** 2.1

Learning Outcomes

1. Recognise rectangles, squares, triangles and circles.
2. Recognise shapes within shapes.

Key Learning Points

1. Basic Shapes

Materials

* Pictures of a range of national flags
* Pencils or pens

Guiding the learners through Activity M1

- Introduce basic geometric shapes using examples from the classroom and everyday objects.

- Explain to the learners what is to happen in the lesson and why it is important to them - for example, describing objects to people over the phone; developing knowledge for interior design.

- Ask the learners to identify the shapes - don't tell them straight away. Ask them also where they might have seen these shapes and allow them to describe them.

- When the learners are working on their tasks, encourage them to consult with each other and debate over the shapes they identify.

- Use pairs, small group work and whole group work as well as individual work, according to your judgement of what would work best to involve your learners actively.

- When the learners have finished their tasks, ask them to find other examples of flags or objects that contain these shapes. If possible, allow them access to the internet to research these shapes.

- Encourage learners to enter new terminology in their personal dictionaries.

- Practice Sheet M1

Identifying Shapes (2)

This activity links to award **learning outcomes 2.1 and 2.2**

Learning Outcomes

:

1. Recognise rectangles, squares, triangles and circles.
2. Recognise shapes within shapes

Key Learning Points

1. Basic geometric shapes

Materials

- Pictures of a range of logos
- Pencils or pens

Prior learning

1. A **rectangle** four sided shapes in which the sides **opposite** each other are equal in length.
2. A **triangle** is a three sided shape.
3. A **square** is a four sided shape in which **all four sides** are equal in length.

Guiding the learners through Activity M2

- Recap on Activity M1: Ask the learners to say what they did and what they learned. Ask them to describe the shapes they worked with in the last lesson, and the measuring instruments they used.

- Explain to the learners what is to happen in the lesson. Show them some of the logos and ask them to identify those logos.

  When the learners are working on their tasks, allow them to consult with each other and debate over the shapes they identify. Ask them why certain irregular shapes in the logos cannot be called triangles, squares, circles or rectangles. When they have said what they think, explain this to them.

- When the learners have finished their tasks, ask them to find other examples of logos that contain these shapes. If possible, allow them access to the internet to research these shapes.

- Ask the students to come up with their own design for a logo using these basic shapes.

- Encourage learners to enter new terminology in their personal dictionaries.

- Practice Sheet M2

Activity   Drawing Logos and Flags   Code M3

This activity links to award learning outcomes 2.1, 2.2 and 2.6

Learning Outcomes

1. Construct rectangles and circles
2. Draw symbols which incorporate more than one shape

Key Learning Points
1. Shapes
2. Drawing

Materials
- Pictures of a range of logos
- Pencil, compass.

Prior learning

1. You need to know how to draw a circle using a compass.
2. You need to know how to draw triangles and rectangles

Guiding the learners through Activity M3

- Recap on the basic shapes the learners have encountered, especially circles and rectangles. Ask the learners to outline the main characteristics of each.

- Discuss terms such as radius, length, and width. Help the learners to come to working definitions for these terms. To do this, discuss with the group what these terms represent. Help them to come up with a definition. Write it down and use it frequently in later lessons.

- Explain to the learners what is to happen in the lesson. Show them the logos and flags they will be drawing and ask them to identify them.

- Demonstrate clearly how to draw a circle using a compass. Stress that the point on the compass needs to be held firmly in one position.

- When the learners have finished their tasks, ask them to find other examples of flags or logos that contain basic shapes which they can draw. If possible, allow them access to the internet to research these shapes.

- Encourage learners to enter new terminology in their personal dictionaries.

- Practice Sheet M3 will give learners practice in measurement.

| Activity | **Calculating Area and Cost** | Code M4 |

This activity links to award learning outcomes 2.1, 2.3 and 2.7

Learning Outcomes

1. Calculate the area of a square and a rectangle.
2. Understand the meaning of a unit squared - for example m^2, cm^2, etc.
3. Calculate the cost of covering a surface given its area and cost of the surface per metre squared.

Key Learning Points

1. Area
2. Cost

Materials

- Calculator
- Pencil or pen

Guiding the learners through Activity M4

- Introduce the concept of area. Have a square metre of cardboard or some such material to show the learners exactly what a square metre is. Have an example of a square centimetre also and a small rectangle (maybe 4cm x 3cm) which is divided into square centimetres.

- Explain to the learners what is to happen in the lesson and ask why it is important to them - for example, describing how big a house or a room is; finding area to decide how much material is needed for flooring or wallpaper etc.

- During the task discuss with the learners how the ground staff would find the length and width of the pitch: what measuring instruments would they use?

- When the learners are working on their tasks, allow them to consult with each other over the methods they use to find the area.

- Use pairs, small group work and whole group work as well as individual work, according to your judgement of what would work best to involve your learners actively.

- When the learners have finished their tasks, ask them to find other examples of when finding the area is important. Give them the opportunity to find the area of regular shaped objects in the room using a measuring tape or a ruler, depending on the object.

- Encourage learners to enter new terminology in their personal dictionaries.

- Practice Sheet M4

Activity   **Creating models of Furniture (1)**   Code M5
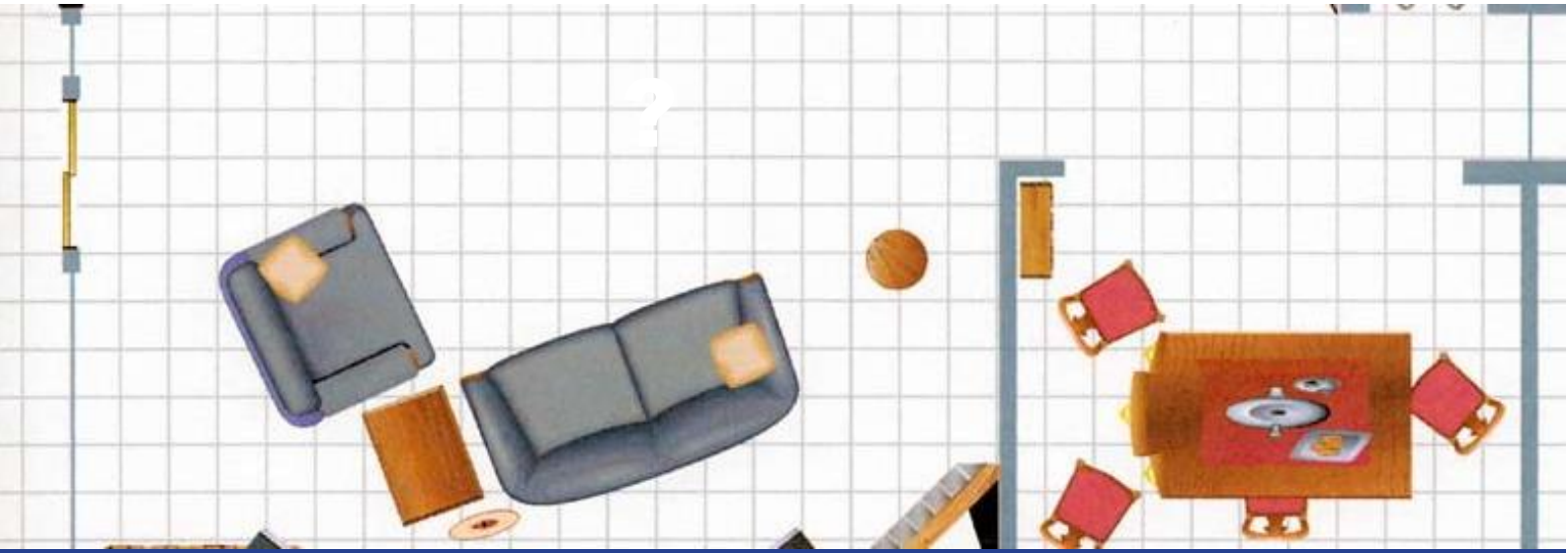
This activity links to **award learning outcomes 2.1, 2.2, 2.3, 2.6 and 2.7**

Learning Outcomes

1.   Calculate the area of basic shapes such as rectangles and triangles.
2.   Create 2-D representations of rectangular and triangular shaped furniture.

Key Learning Points
1. Area
2. Language of geometry
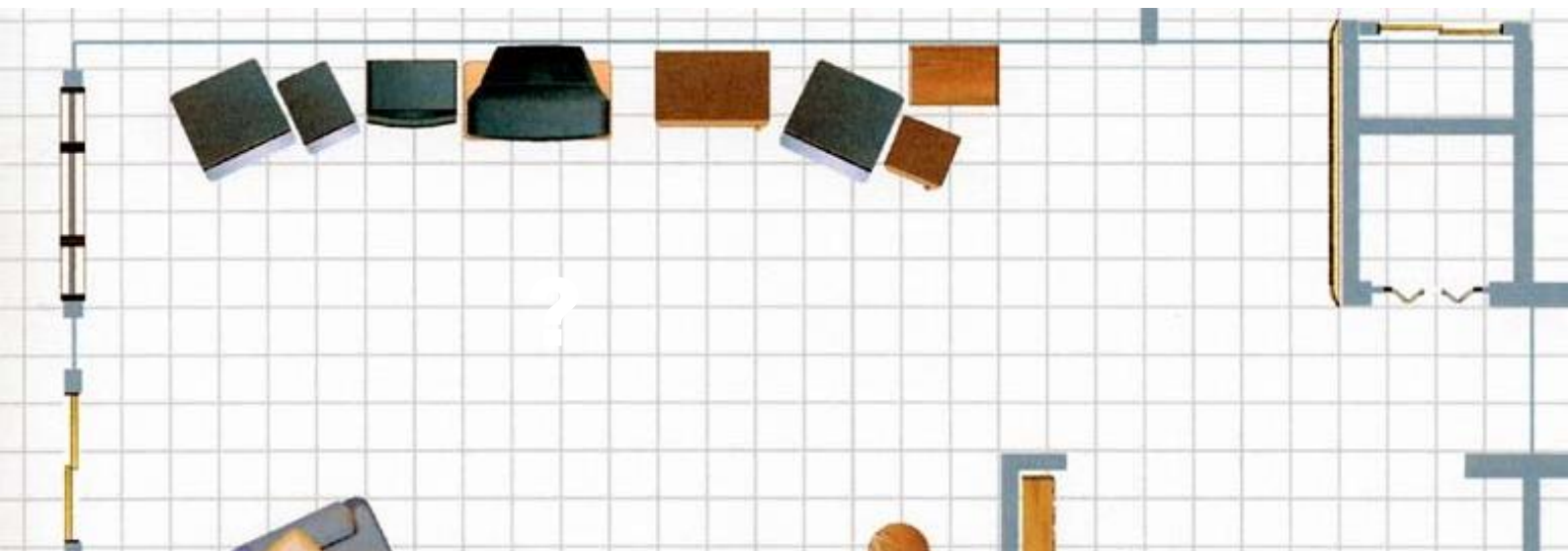
Materials
● Calculator
● Ruler
● Pencil or pen
● Protractor

Guiding the learners through Activity M5

- Explain to the learners what is to happen in the lesson and why it is important, for example in design of objects and in representing objects in plans.

- Recap on the characteristics of a rectangle. Explain, demonstrate and discuss terms like perpendicular, horizontal and vertical.

- Demonstrate how to draw a rectangle. Place particular emphasis on correct measurement and constructing right angles.

- Mark out the square centimetres within the rectangle so that the learners can first count the number of squares and then calculate the area of the rectangle. The number of squares counted should be equal to the area calculated.

- When the learners are working on their tasks, allow them to consult with each other and check each other's work.

- Use pairs, small group work and whole group work as well as individual work, according to your judgement of what would work best to involve your learners actively.

- Ask learners to find other examples of rectangular objects and to draw them. them access to the internet to research the dimensions of these shapes.

- Guide learners through Tasks 3 – 6 on lines, angles and triangles. Gives learners plenty of time to explore the cncepts and to practise the skills that you will demonstrate, such as bisecting a triangle. They may also watch these skills demonstrated on websites such as You Tube.

- Encourage learners to enter new terminology in their personal dictionaries.

- Practice Sheet M5

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Activity

Investigating Pi

Code M6

This activity links to **award learning outcomes 2.1, 2.2, 2.3, 2.6 and 2.7**

Learning Outcomes

1. Calculate the area of basic shapes such as rectangles and circles.
2. Create 2-D representations of rectangular and circular shaped furniture.
3. Understand what Pi is.

Key Learning Points

1. Area - circles

Materials

- Calculator
- Ruler
- Pencil or pen
- Protractor

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Guiding the learners through Activity M6

- Explain to the learners what is to happen in the lesson and why it is important e.g. design of objects, representing objects in plans, markings on a soccer pitch.

- Recap on the characteristics of a circle. Explain, demonstrate and discus terms like radius, diameter, and, possibly, circumference.

- Demonstrate how to draw a circle. Place particular emphasis on correct measurement and maintaining the position of the point of the compass.

- If there is time, mark out a square centimetres grid around the circle.
  This can be used to discuss the nature of area in a circle: for example, is it easy to figure out the area of the circle using the grid? Can you estimate the area?
  Calculate it using the formula πr^2

  (See example at hhttp://inperc.com/wiki/index.php?title=Image:Circle-grid.gif)

- Explain the formula: firstly explain the concept of a formula in maths and why it is useful. Make sure that learners understand this particular formula and how to use it.

- Use pairs, small group work and whole groupwork as well as individual work, according to your judgement of what would work best to involve your learners actively.

- When the learners are working on their tasks, allow them to consult with each other and check each other's work.

- Encourage learners to enter new terminology in their personal dictionaries.

- When the learners have finished their tasks, ask them to find other examples of circular objects in the house and to draw them.
- Practice Sheet M6

Activity   Creating models of Furniture (2)   Code M7
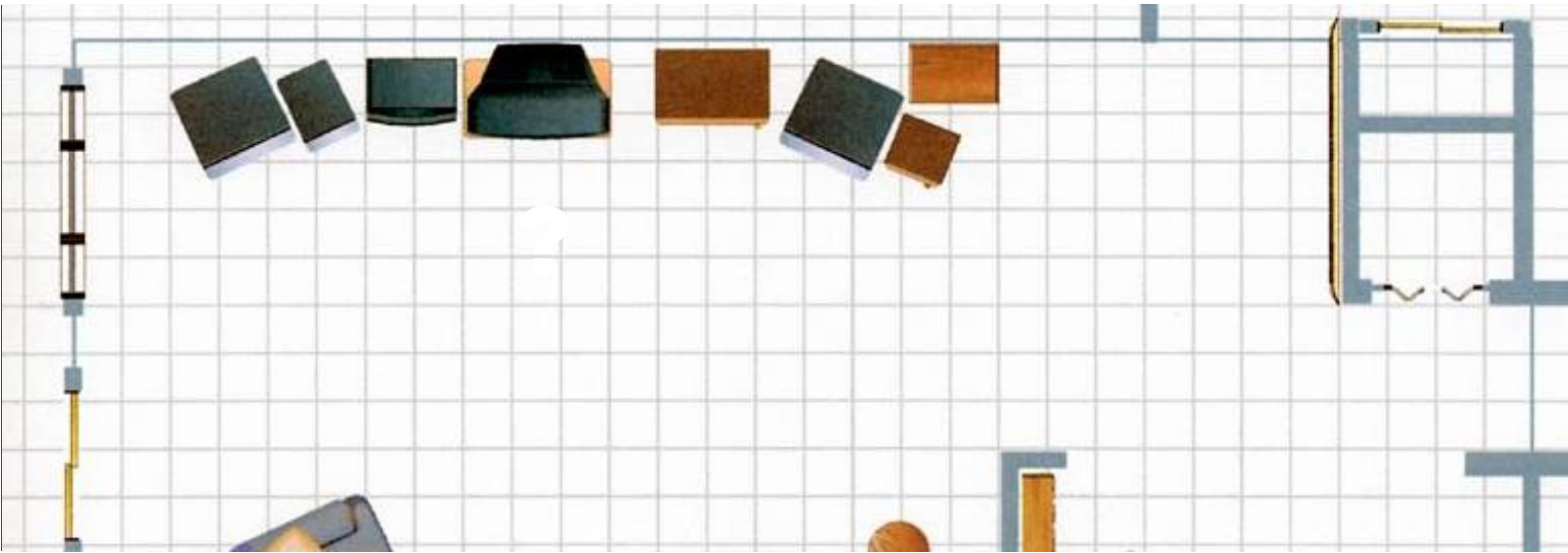
This activity links to **award learning outcomes 2.1, 2.2, 2.3, 2.6 and 2.7**

Learning Outcomes

1. Calculate the area of basic shapes such as rectangles and circles
2. Create 2-D representations of rectangular and circular shaped furniture

Key Learning Points

1. Area of square

Materials

- Calculator
- Ruler
- Compass
- Pencil or pen
- Protractor

Guiding the learners through Activity M7

- Explain to the learners what is to happen in the lesson and why it is important, using examples from real life.

- Recap on the characteristics of a square. Explain, demonstrate and discuss terms like perpendicular, horizontal and vertical.

- Demonstrate how to draw a square. Place particular emphasis on correct measurement and constructing right angles. Ask the learners to discuss this question: Would there be a problem if they were only given the length of one side?

- If there is time, mark out the square centimetres within the square so that the learners can first count the number of squares and then calculate the area of the square. The number of squares counted should be equal to the area calculated.

- When the learners are working on their tasks, allow them to consult with each other and check each other's work: Are the measurements exact? Is there a right angle at each corner?

- When the learners have finished their tasks, allow them time to complete models of other pieces of furniture they have not made and duplicates of other models if they wish to include more than one in their room design.

- Use pairs, small group work and whole group work as well as individual work, according to your judgement of what would work best to involve your learners actively.

- Encourage learners to enter new terminology in their personal dictionaries.
- Practice Sheet M7

Activity	**Calculating area**	Code M8

This activity links to award learning outcomes 2.1, 2.3, 2.6 and 2.7

Learning Outcomes

1. Calculate the area of a rectangle.
2. Understand the meaning of a unit^2 - for example, m^2, cm^2 etc.
3. Calculate the cost of covering a surface given its area and knowing the cost per m^2.

Key Learning Points

1. Area
2. Cost

Materials

- Calculator
- Pencil or pen
- Ruler
- Protractor

Prior learning

Area is recorded in (units)^2, for example 3 cm^2, 2m^2.

We measure the area of a rectangle by multiplying the length by the width.

Guiding the learners through Activity M8

- Explain to the learners what is to happen in the lesson and why it is important - for example, budgeting for DIY, figuring out amount of material needed.

- Recap on the characteristics of a rectangle. Explain, demonstrate and discuss t terms like perpendicular, horizontal and vertical.

- Recap on how to draw a rectangle and find its area.

- If there is time, mark out the square centimetres within the rectangle so that the learners can first count the number of squares and then calculate the area of the rectangle. The number of squares counted should be equal to the area calculated.

- When the learners are working on their tasks, allow them to consult with each other and check each other's work. Are the measurements exact? Is there a right angle at each corner? Has the correct formula been used and is the answer right?

- When the learners have finished their tasks, ask them to complete their room design and present it as part of their portfolio.

- Use pairs, small group work and whole group work as well as individual work, according to your judgement of what would work best to involve your learners actively.

- Encourage learners to enter new terminology in their personal dictionaries.

- Practice Sheet M8

Activity   Calculating actual distance   Code M9

This activity links to **award learning outcomes 2.1, 2.4, 2.5 and 2.7**

Learning Outcomes

1. Calculate the actual distance from one point to another when given a map which is drawn to a given scale.
2. Convert cm to metres or kilometres.
3. Recognise what scale is being used and how to use it to gather vital information.

Key Learning Points
1. Scale
2. Map

Materials

- Calculator
- Pencil or pen
- Ruler
- Map

Guiding the learners through Activity M9

- Ask the learne what they would do if they had to draw a plan of the room they are in.

  How could you fit a big room on a small page? Would the measurements be the same? How would you make sure that you fit everything in? Would you make the some parts smaller in the drawing and leave some parts the same?

- Explain what **scale measurements** are and why they are useful.

- Ask learners where they would see scaled measurements used.

- Introduce the map of Italy and go through the examples set out. Make sure to demonstrate clearly how to measure the exact distance between cities on the map.

- Ask the learners these questions and let them discuss them in pairs or small groups:
   If 1 cm represents 100 km, what does 2 cm represent? How did you get that answer?
    If 1 cm represents 100 km, what does 5 cm represent? How did you get that answer?

- Then show the method and explain further if necessary. Check the learners' progress
   throughout and allow them to offer solutions to each question as the class progresses.

- Use pairs, small group work and whole group work as well as individual work, according to your judgement of what would work best to involve your learners actively.

- Encourage learners to enter new terminology in their personal dictionaries.
- Practice Sheet M9
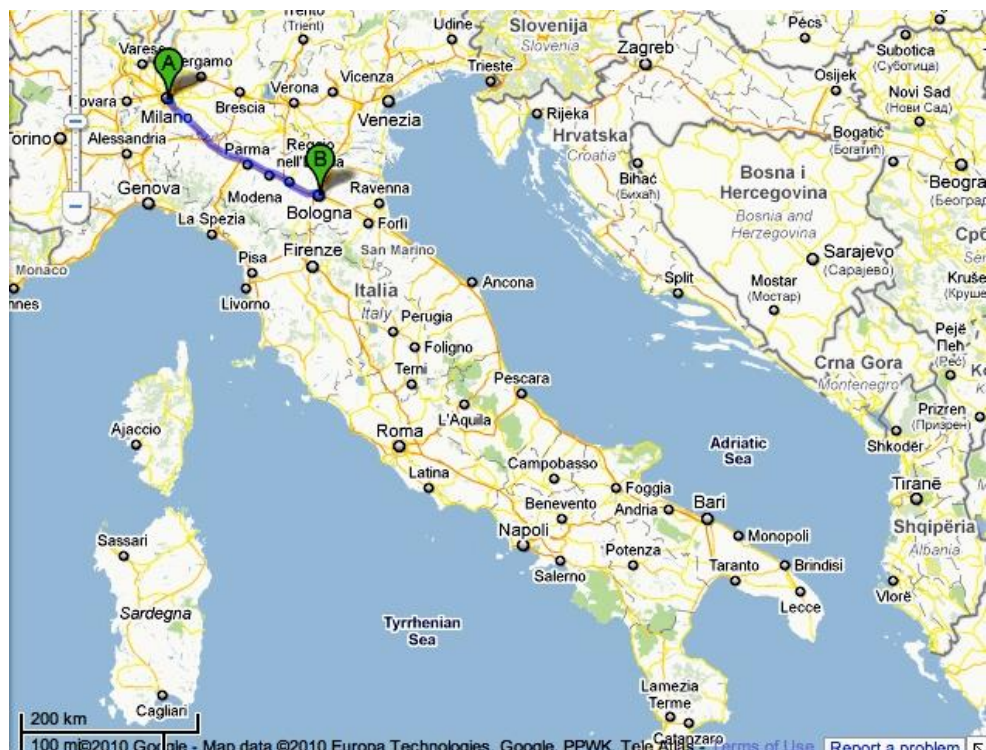
Activity   **Calculating volume**   Code M10

This activity links to award learning outcomes 2.1, 2.4 and 2.7

Learning Outcomes

1. Calculate the volume of a cylinder
2. Understand the meaning of a unitł for example, 3 mł, 10cmł.
3. Convert cmł to ml and ml to litres.

Key Learning Points

1. Volume
2. Units

Materials

- Calculator
- Pencil or pen

Guiding the learners through Activity M10

- Discuss with the learners what they understand **volume** to be? Give an example like a glass - how would you describe the volume of this glass? Is it the space inside the glass? Why would you find out the volume of a glass?

- Present and explain the formula for finding the volume of a cylinder (like a glass or a food container or a boiler).

- Explain that volume is measured in units cubed. You could point out that volume is for 3D objects and area is for 2D.

- Introduce the boiler problem, give a little background and draw a picture of the boiler on the whiteboard or flipchart, showing the maximum height level of the water.

- Ask the group to find the volume of everyday cylindrical objects such as a glass or a food container by taking measurements and using the formula. You should do this yourself in advance of the class, using the same objects that the learners will use.

- Check the learners' progress throughout and allow them to offer solutions to each question as the class progresses.

- Use pairs, small group work and whole group work as well as individual work, according to your judgement of what would work best to involve your learners actively.

- Encourage learners to enter new terminology in their personal dictionaries.

- Practice Sheet M10

Acknowledgements