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INSURANCE SECTOR EDUCATION
AND TRAINING AUTHORITY

Learner Name	
ID Number	
Organisation	

FORMATIVE ASSESSMENT: LEARNER WORK FILE VERSION 1

Unit Standard Title:

**Represent, analyse and calculate shape
and motion in 2 and 3 dimensional space
in different contexts**

Unit Standard No: **9016**
Unit Standard Credits: **4**
NQF Level: **4**

Mark information:

Specific Outcome/Section	1	2	3	4	5	Total	%	C / NYC
Maximum marks	47	81	98			226	100	

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Section 1: 47 marks

Activity 1

(10 marks)

Fill in the answers.

(a) 35 m = _____ mm	(b) 0,7 m = _____ mm
(c) 56 mm = _____ m	(d) 80 km = _____ m
(e) 32 cm = _____ mm	(f) 790 cm = _____ m
(g) 600 m = _____ km	(h) 23,7 km = _____ m
(i) 451 m = _____ cm	(j) 64 mm = _____ cm

Activity 2

(13 marks)

2.1 (a) Estimate the length of the following lines A, B and C and then
 (b) Measure them accurately. (6)
 Give your answer in cm or mm.

A _____ (a) _____ (b) _____
 B _____ (a) _____ (b) _____
 C _____ (a) _____ (b) _____

2.2 (a) **Estimate** the dimensions of the floor in your training room.

Estimated length = _____ Estimated breadth = _____ (2)

(b) Accurately measure the floor area of the training room. If the cost of carpeting is R30 per m², estimate how much it would cost to carpet the training room. (5)

Length = _____ Breadth = _____

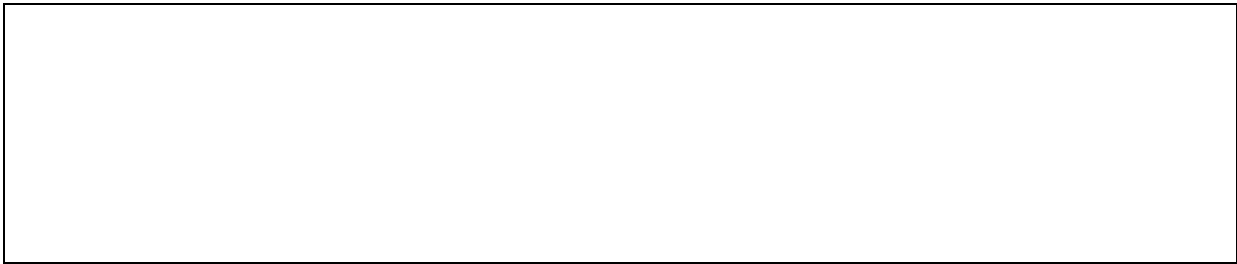
Area =

Cost =

Activity 3**(12 marks)**

3.1 Calculate the area in square units of:

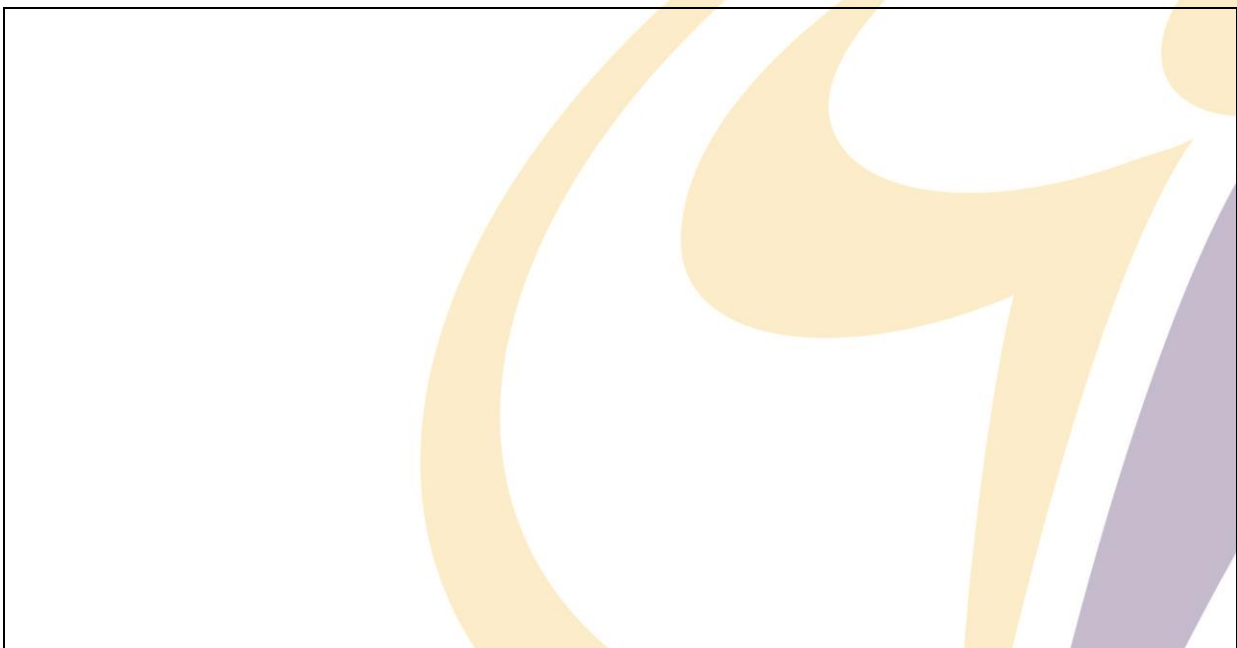
(a) A rectangle with length 6cm and breadth 5 cm (3)



(b) A triangle with base 6cm and height 8 cm (3)

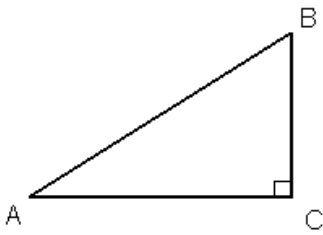


3.2 Calculate the area and circumference of a circle with radius 7 cm (6)



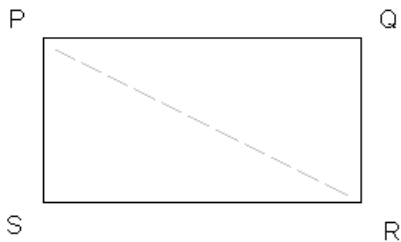
Activity 4**(12 marks)**

1.



Triangle ABC is right angled at C. Find the length of AB correct to 1 decimal place if AC = 5cm and BC = 6cm (6)

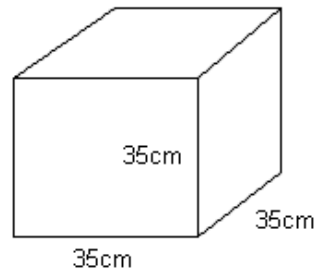
2.



A rectangular field is to be divided along its diagonal PR into two plots. If the dimensions of the field are 150m by 75m, calculate the length of fencing needed to divide the field (calculate the length of PR). Round off to an acceptable level of accuracy. (6)

Section 2: 81 marks**Activity 5****(21 marks)**

5.1 Consider a wooden crate that measures 35 cm X 35 cm X 35 cm.



- (a) If we wanted to paint the outside of the crate, would we calculate the surface area or the volume of the crate?

(1)

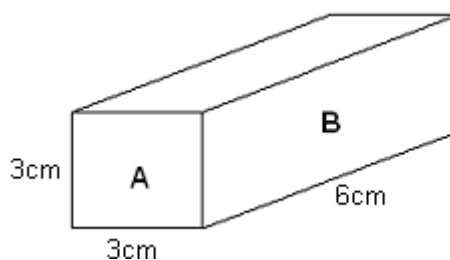
- (b) If we wanted to work out how much sand would be needed to fill the crate, would we calculate the surface area or the volume of the crate?

(1)

- (c) Calculate the surface area (the crate is closed at the top. i.e. it has a lid). (5)

- (d) Calculate the volume of the crate. (3)

5.2 Consider the rectangular block represented here:



(a) How many faces does the block have? (1)

(b) What is the area of face A? (Remember that area = $L \times B$) (2)

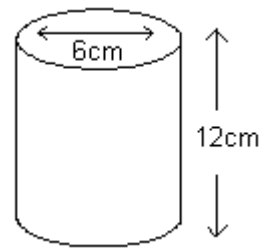
(c) What is the area of face B? (2)

(d) What is the surface area of the block? (3)

(e) What is the volume of the block? Be careful to give your answers in the correct units. (3)

Activity 6

The cylindrical can drawn here has a height of 12cm and a diameter of 6cm.

(15 marks)

- (a) What is the volume of the can? Use $\pi = 3.14$ (2)
(Remember: volume = area of base X height).

- (b) If $1\text{cm}^3 = 1\text{ml}$, how many milliliters of cold drink does the can hold? (1)

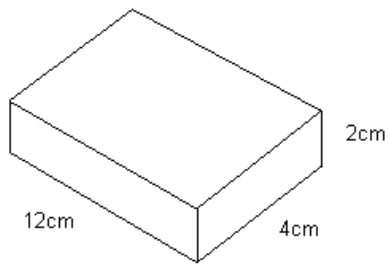
- (c) What is the usual volume of liquid in a can of soda? (1)

- (d) If a can manufacturer wanted to calculate how much metal was needed to make a cold drink can, what measurement would he need – volume or surface area? (1)

- (e) Calculate the surface area of the can. (Remember that the circumference of a circle is πd where d is the diameter of the circle) (10)

Activity 7**(10 marks)**

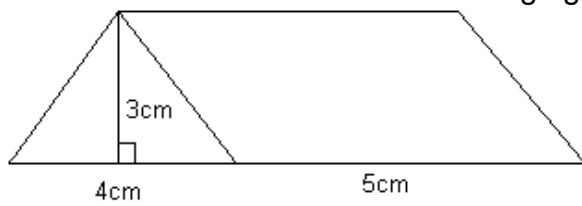
7.1 Consider the following figure:



- a) Find its volume (3)
b) Find its surface area (3)

7.2 Find the volume of the following figure

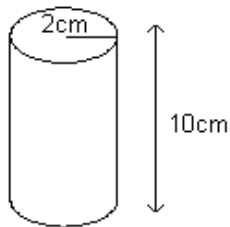
(4)



Assessment 1**(23 marks)**

1. (a) Find the volume of a box with a rectangular base measuring 20cm by 5cm and a height of 25cm. (Draw a rough sketch of the box). (3)

2. Consider the figure below:



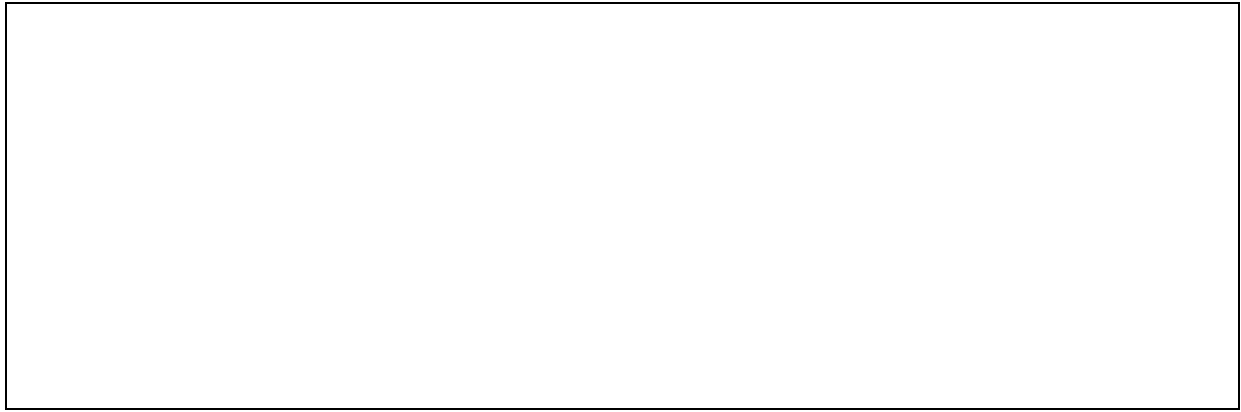
- | | |
|---------------------------------|------|
| (i) Describe its shape | (1) |
| (ii) Find its volume | (3) |
| (iii) Draw a net of the figure | (1) |
| (iv) Calculate its surface area | (10) |

(i)

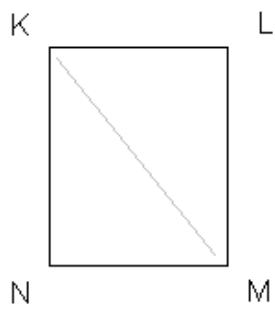
(ii)

(iii)

(iv)



3.

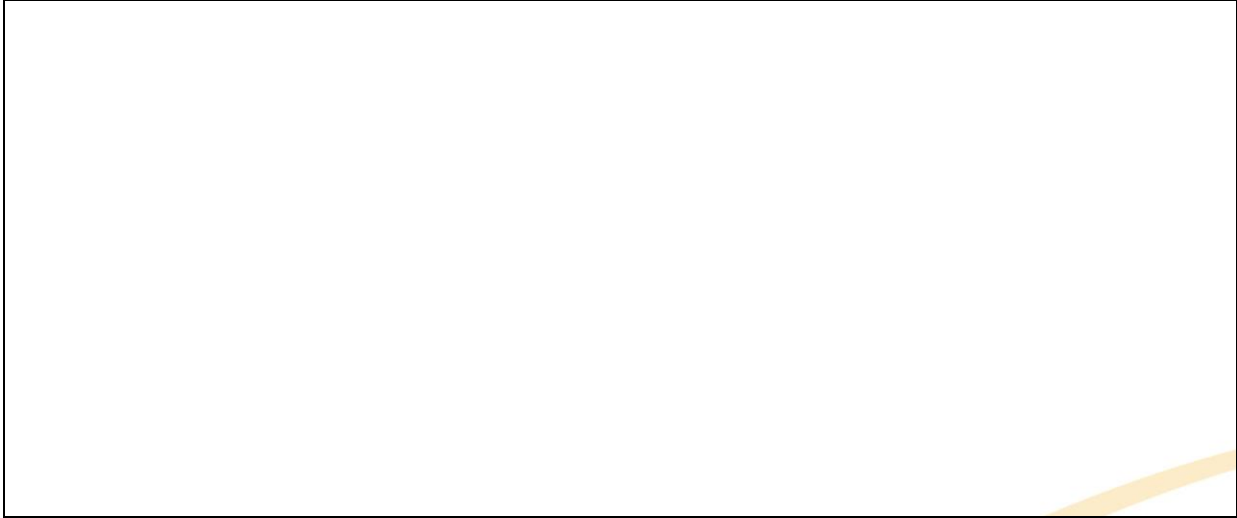


A rectangular door KLMN measuring 1,8m X 0,6m needs a support KM to make it stable. How long should the piece of wood KM be? (5)



Activity 8**(12 marks)**

8.1 Find the volume and surface area of a sphere with a radius of 1,2m (4)



8.2 Find the volume and surface area of a cone with a radius of 5cm and a perpendicular height of 11cm.

(8)



Section 3: 98 marks**Activity 9****(6 marks)**

Find 3 items to measure their mass.

(a) Estimate the mass of the object.

(b) Choose the correct instrument and accurately measure the object's mass.

9.1 (a) _____ (b) _____

9.2 (a) _____ (b) _____

9.3 (a) _____ (b) _____

Activity 10**(6 marks)**

Use a thermometer to

(a) estimate and

(b) record the temperature of the following:

10.1 a cup of hot water (a) _____ (b) _____

10.2 a glass of tap water (a) _____ (b) _____

10.3 a glass of ice water (a) _____ (b) _____

Activity 11**(6 marks)**

11.1 Record the time at this moment.

_____ (1)

11.2 What will the time be in 12 hours time?

_____ (1)

11.3 A journey takes 6 hours. If you leave home at 19.30, what time will you reach your destination?

(1)

11.4 If the distance you have traveled is 598km, and you take 6 hours (without stopping), what speed were you travelling?

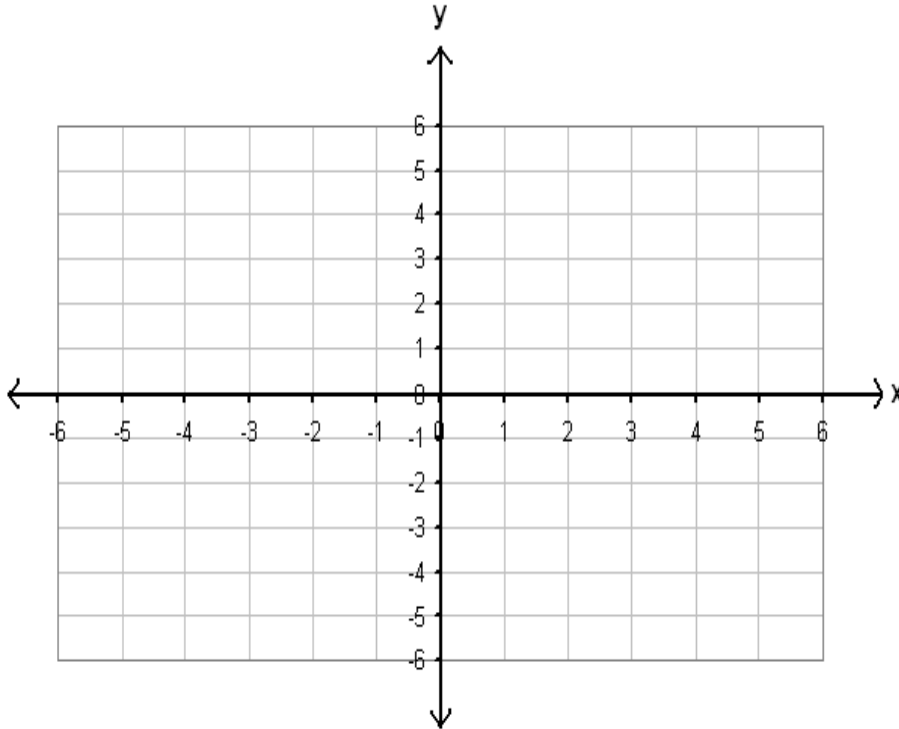
(3)

Activity 12

(25 marks)

12.1 Use the set of axes given, to plot the following points: (10)

H (1;2), I (4;0), J (3;-4) , K (-1;6) , L (-4;5) , M (0;3) , N (2; -2), P (-3;0) ,Q (0;-3) ,
R (-2;-5)

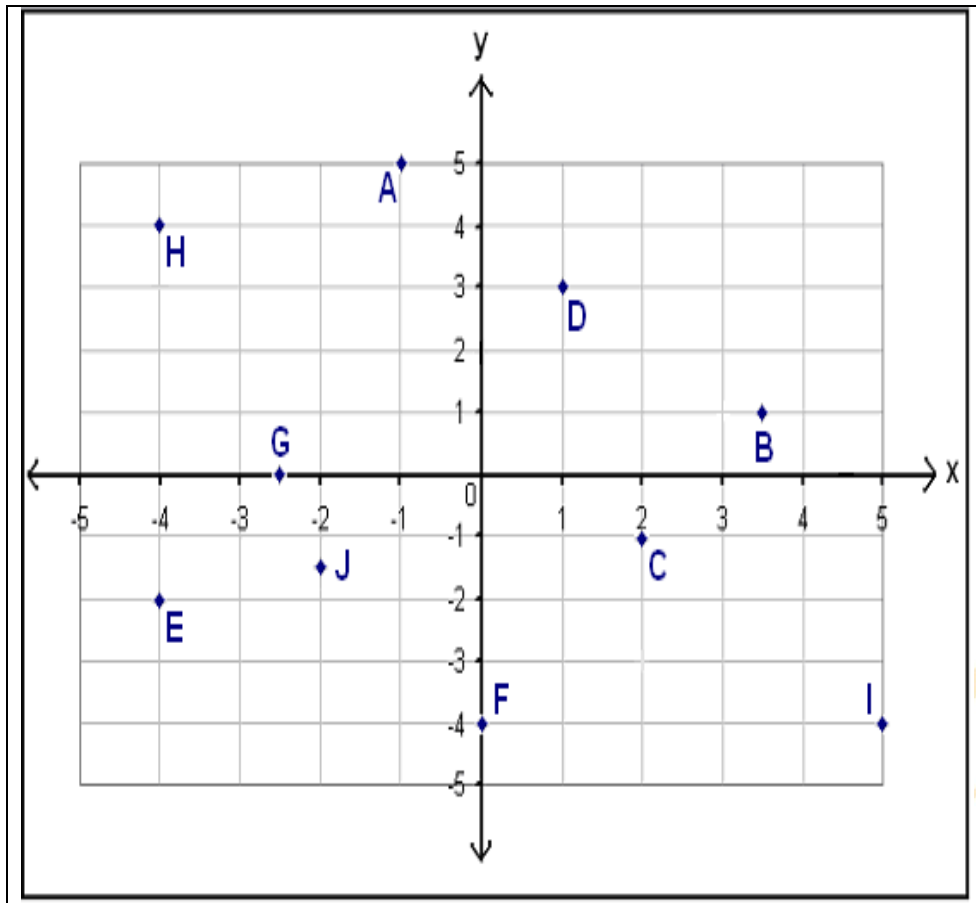


12.2 Using the Cartesian plane below,

(a) Write down the co-ordinates of the points A to J. (Use the table on the right of the plane) (10)

(b) Give the co-ordinates of a point which is: (5)

- (i) 2 units to the left of F _____
- (ii) 2 units above E _____
- (iii) 3 units to the left of D _____
- (iv) 3 units below the origin _____
- (v) 4 units to the right of H _____



A (;)
B (;)
C (;)
D (;)
E (;)
F (;)
G (;)
H (;)
I (;)
J (;)

Assessment 2**(12 marks)**

1. Find the volume and surface area of a sphere with a radius of 6cm

(4)

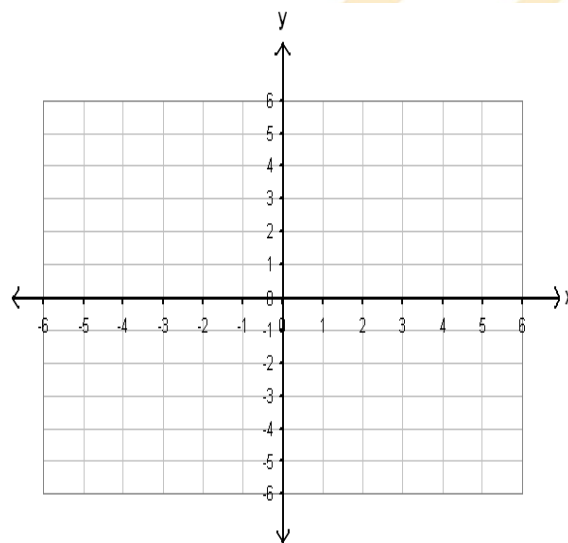
2. A transport truck containing cartons of spices drives from Durban to Umtata, a distance of 436kms.

a) If the truck takes 5 hours to reach Umtata, what is its average speed? (3)

b) If the truck leaves Durban at 22.10, what time will it reach Umtata? (1)

3. On the following set of axes, plot the points A(-1;5), B(6;-3), C(2;0), D(-4;-4)

(4)



Activity 13**(14 marks)**

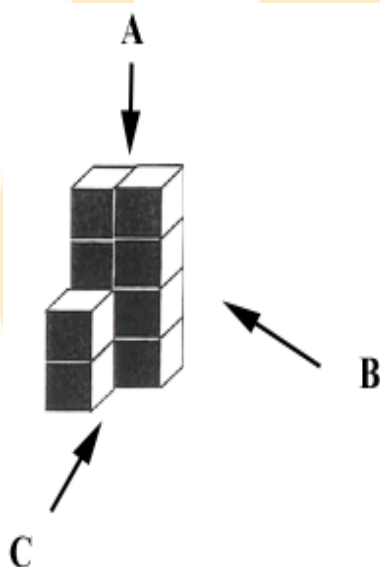
13.1 You may choose any item you have with you and draw 4 different perspectives of it. (You could draw a book or a ruler or a sharpener). Remember:

- Draw it at eye level
- Keep the scale the same in each perspective

(8)

(a) From above (2 marks)	(b) From underneath (2marks)
(c) From the front (2 marks)	(d) From the left (2 marks)

13.2 Look at the diagram below.

(6)

Draw what you would see from the direction of

(a) arrow A (2 marks)	(b) arrow B (2 marks)	(d) arrow C (2 marks)
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Activity 14

(14 marks)

14.1 (a) Using a scale of 1:50, draw a plan of a kitchen with length 4 m and breadth 3m.

(b) On your plan, put in a stove measuring 0,5 m x 0,5 m, and a 2 m x 1 m table.

Kitchen (2 marks)

stove (2 marks)

table (2 marks)

14.2. Here is a plan of a house.



Scale: 1 : 150

(a) What are the dimensions of the bedroom on the drawing? (2)

(b) What are the actual dimensions of the bedroom? (4)

(c) How many squares metres of tiles should be bought to tile the bedroom? (2)

Activity 15

(5 marks)

Using the scale given on the map on page 23 of your Learner Guide, calculate the approximate distance from:

Use the scale: 1cm = 40 km

a) Durban to Empangeni
(4cm) _____

b) Richard's Bay to Hluhluwe
(3cm) _____

c) Port Edward to Durban
(5cm) _____

d) Pietermaritzburg to Dundee (passing through Greytown)
(5,2cm) _____

e) Umhlanga to Mkuze
(7,9cm) _____

Activity 16**(10 marks)**

Use the World Map of Time Zones on page 26 of your Learner Guide to answer the following:

16.1 If it is 5.30 in the United Kingdom, calculate the time it will be in: (5)

- a) Eastern Australia (K) _____
- b) South Africa (B) _____
- c) Brazil (P) _____
- d) India (E) _____
- e) Alaska (V) _____

16.2 It is 14.30 in South Africa and you need to contact an overseas client. What time will it be in his/her country if the client lives in: (5)

- a) New Zealand (M) _____
- b) France (A) _____
- c) New York (Q) _____
- d) Japan (I) _____
- e) London (Z) _____



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SOUTH AFRICAN QUALIFICATIONS AUTHORITY

REGISTERED UNIT STANDARD:

Represent analyse and calculate shape and motion in 2-and 3-dimensional space in different contexts

SAQA US ID	UNIT STANDARD TITLE			
9016	Represent analyse and calculate shape and motion in 2-and 3-dimensional space in different contexts			
ORIGINATOR		ORIGINATING PROVIDER		
SGB Math Literacy, Math, Math Sciences L 2 -4				
QUALITY ASSURING BODY				
-				
FIELD			SUBFIELD	
Field 10 - Physical, Mathematical, Computer and Life Sciences			Mathematical Sciences	
ABET BAND	UNIT STANDARD TYPE	OLD NQF LEVEL	NEW NQF LEVEL	CREDITS
Undefined	Regular-Fundamental	Level 4	NQF Level 04	4
REGISTRATION STATUS		REGISTRATION START DATE	REGISTRATION END DATE	SAQA DECISION NUMBER
Reregistered		2009-07-01	2012-06-30	SAQA 0480/09
LAST DATE FOR ENROLMENT		LAST DATE FOR ACHIEVEMENT		
2013-06-30		2016-06-30		

In all of the tables in this document, both the old and the new NQF Levels are shown. In the text (purpose statements, qualification rules, etc), any reference to NQF Levels are to the old levels unless specifically stated otherwise.

This unit standard does not replace any other unit standard and is not replaced by any other unit standard.

PURPOSE OF THE UNIT STANDARD

This unit standard is designed to provide credits towards the mathematical literacy requirements of the NQF at level 4. The essential purposes of the mathematical literacy requirements are that, as the learner progresses with confidence through the levels, the learner will grow in:

- An insightful use of mathematics in the management of the needs of everyday living to become a self-managing person.
- An understanding of mathematical applications that provides insight into the learner's present and future occupational experiences and so develop into a contributing worker.
- The ability to voice a critical sensitivity to the role of mathematics in a democratic society and so become a participating citizen.

People credited with this unit standard are able to:

- Measure, estimate, and calculate physical quantities in practical situations relevant to the adult with increasing responsibilities in life or the workplace
- Explore analyse and critique, describe and represent, interpret and justify geometrical relationships and conjectures to solve problems in two and three dimensional geometrical situations

LEARNING ASSUMED TO BE IN PLACE AND RECOGNITION OF PRIOR LEARNING

The credit value is based on the assumption that people starting to learn towards this unit standard are competent in Mathematical Literacy and Communications at NQF level 3.

UNIT STANDARD RANGE

The scope of this unit standard includes length, surface area, volume, mass, speed ; ratio, proportion; making and justifying conjectures.

Contexts relevant to the adult, the workplace and the country.

More detailed range statements are provided for specific outcomes and assessment criteria as needed.

Specific Outcomes and Assessment Criteria:

SPECIFIC OUTCOME 1

Measure, estimate, and calculate physical quantities in practical situations relevant to the adult.

OUTCOME NOTES

Measure, estimate, and calculate physical quantities in practical situations relevant to the adult with increasing

responsibilities in life or the workplace.

OUTCOME RANGE

- Basic instruments to include those readily available such as rulers, measuring tapes, measuring cylinders or jugs, thermometers, spring or kitchen balances, watches and clocks.
- In situations which necessitate it such as in the workplace, the use of more accurate instruments such as vernier callipers, micrometer screws, stop watches and chemical balances.
- Quantities to estimate or measure to include length/distance, area, mass, time, speed acceleration and temperature.
- Distinctions between mass and weight, speed and acceleration.
- The quantities should range from the low or small to the high or large.
- Mass, volume temperature, distance, and speed values are used in practical situations relevant to the young adult or the workplace.
- Calculate heights and distances using Pythagoras' theorem.
- Calculate surface areas and volumes of right prisms (i.e., end faces are polygons and the remaining faces are rectangles) cylinders, cones and spheres from measurements in practical situations relevant to the adult or in the workplace.

ASSESSMENT CRITERIA

ASSESSMENT CRITERION 1

1. Scales on the measuring instruments are read correctly.

ASSESSMENT CRITERION 2

2. Quantities are estimated to a tolerance justified in the context of the need.

ASSESSMENT CRITERION 3

3. The appropriate instrument is chosen to measure a particular quantity.

ASSESSMENT CRITERION 4

4. Quantities are measured correctly to within the least step of the instrument.

ASSESSMENT CRITERION 5

5. Appropriate formulae are selected and used.

ASSESSMENT CRITERION 6

6. Calculations are carried out correctly and the least steps of instruments used are taken into account when reporting final values.

ASSESSMENT CRITERION 7

7. Symbols and units are used in accordance with SI conventions and as appropriate to the situation.

SPECIFIC OUTCOME 2

Explore, analyse & critique, describe & represent, interpret and justify geometrical relationships.

OUTCOME NOTES

Explore, analyse and critique, describe and represent, interpret and justify geometrical relationships and conjectures to solve problems in two and three dimensional geometrical situations.

OUTCOME RANGE

- Applications taken from different contexts such as packaging, arts, building construction, dressmaking.
- The operation of simple linkages and mechanisms such as car jacks.
- Top, front and side views of objects are represented.
- Use rough sketches to interpret, represent and describe situations.
- The use of available technology (e.g., isometric paper, drawing instruments, software) to represent objects.
- Use and interpret scale drawings of plans (e.g., plans of houses or factories; technical diagrams of simple mechanical household or work related devices,
- Road maps relevant to the country.
- World maps.
- International time zones.
- The use of the Cartesian co-ordinate system in determining location and describing relationships in at least two dimensions.

ASSESSMENT CRITERIA**ASSESSMENT CRITERION 1**

1. Descriptions are based on a systematic analysis of the shapes and reflect the properties of the shapes accurately, clearly and completely.

ASSESSMENT CRITERION 2

2. Descriptions include quantitative information appropriate to the situation and need.

ASSESSMENT CRITERION 3

3. 3-dimensional objects are represented by top, front and side views.

ASSESSMENT CRITERION 4

4. Different views are correctly assimilated to describe 3-dimensional objects.

ASSESSMENT CRITERION 5

5. Available and appropriate technology is used in producing and analysing representations.

ASSESSMENT CRITERION 6

6. Relations of distance and positions between objects are analysed from different views.

ASSESSMENT CRITERION 7

7. Conjectures as appropriate to the situation, are based on well-planned investigations of geometrical properties.

ASSESSMENT CRITERION 8

8. Representations of the problems are consistent with and appropriate to the problem context. The problems are represented comprehensively and in mathematical terms.

ASSESSMENT CRITERION 9

9. Results are achieved through efficient and correct analysis and manipulation of representations.

ASSESSMENT CRITERION 10

10. Problem-solving methods are presented clearly, logically and in mathematical terms.

ASSESSMENT CRITERION 11

11. Reflections on the chosen problem solving strategy reveal strengths and weaknesses of the strategy.

ASSESSMENT CRITERION 12

12. Alternative strategies to obtain the solution are identified and compared in terms of appropriateness and effectiveness.

UNIT STANDARD ACCREDITATION AND MODERATION OPTIONS

- This Unit Standard will be assessed by an assessor and moderated by a moderator, registered with the relevant accredited ETQA responsible for the quality assurance of this Unit Standard.
- Any institution offering learning that will enable achievement of this Unit Standard must be accredited as a provider through the appropriate quality assuring ETQA, or Learning Programme approval with an ETQA that has a Memorandum of Understanding with the quality assuring ETQA.
- Verification (external moderation) of assessment and moderation by the provider, will be conducted by the relevant quality assuring ETQA according to the moderation guidelines in the relevant Qualification and the agreed ETQA policy and procedures.

- An individual wishing to be assessed through RPL against this Unit Standard, may apply to an assessment agency or provider institution accredited by the relevant quality assuring ETQA, or by an ETQA that has a formal agreement/accreditation with the relevant quality assuring ETQA.

UNIT STANDARD ESSENTIAL EMBEDDED KNOWLEDGE

The following essential embedded knowledge will be assessed through assessment of the specific outcomes in terms of the stipulated assessment criteria. Candidates are unlikely to achieve all the specific outcomes, to the standards described in the assessment criteria, without knowledge of the listed embedded knowledge. This means that the possession or lack of the knowledge can be inferred directly from the quality of the candidate's performance against the standards.

- Properties of geometric shapes
- Surface area and volume
- Mathematical argument and evaluation based on logical deduction
- Spatial interrelationships

Critical Cross-field Outcomes (CCFO):

UNIT STANDARD CCFO IDENTIFYING

- Identify and solve problems using critical and creative thinking:
Solve a variety of problems relevant to the adult with increasing responsibilities involving space, shape and time using geometrical techniques.

UNIT STANDARD CCFO COLLECTING

- Collect, analyse, organise and critically evaluate information:
Gather, organise, evaluate and critique information about objects and processes.

UNIT STANDARD CCFO COMMUNICATING

- Communicate effectively:
Use everyday language and mathematical language to describe properties, processes and problem solving methods.

UNIT STANDARD CCFO SCIENCE

- Use mathematics:
Use mathematics to analyse, describe and represent realistic and abstract situations and to solve problems relevant to the adult with increasing responsibilities.

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