

SENIOR SECONDARY INTERVENTION PROGRAMME 2013



education

Department: Education

GAUTENG PROVINCE

GRADE 12

MATHEMATICAL LITERACY

TEACHER NOTES

The SSIP is supported by



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TEACHER NOTES

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SESSION 1: TOPIC 1: PERSONAL AND BUSINESS FINANCE PART I

Teacher Note: Learners battle with interest calculations. Ensure that they understand what they are calculating and why. Once they understand the basic concepts, calculations should follow smoothly. We have included a number of examples for you to work through with your learners to ensure that they have grasped interest calculation fully. It is important that you ensure that the learners adhere to the time limits.

SECTION A: TYPICAL EXAM QUESTIONS**QUESTION 1**

Peter invests R2000 at 7% simple interest per annum paid quarterly for a period of five and a half years.

- 1.1 Convert the interest rate into a quarterly rate. (2)
 - 1.2 Work out the number of interest intervals for the investment. (2)
 - 1.3 Calculate the value of the investment at the end of the five and a half years. (4)
 - 1.4 Calculate the interest value over the whole period. (2)
- [10]

QUESTION 2

2.1 Paul invests R5 000,00 for seven years at 8,5% interest compounded annually.

- a. Draw up a table that shows the value of the investment after each year as well as the interest earned up to the end of each year. (4)
 - b. Using the table, give the value of the investment at the end of four years. (1)
 - c. Use the table to calculate by how much the interest has increased from the sixth to the seventh year. (2)
 - d. Why does the interest increase from year to year? (3)
- [10]

2.2 Compare the following two scenarios:

A: R1500,00 invested for three years at 8% simple interest

B: R1500,00 invested for three years at 7,5% compound interest

- a. Which of the investments gives a higher return at the end of the period? (9)
 - b. Explain why a smaller interest rate, which is compounded could yield more than a higher simple interest rate over the same period. (3)
- [12]

SECTION B: SOLUTIONS AND HINTS TO SECTION A**QUESTION 1**1.1 There are 4 quarters per year: $7 \div 4 = 1,75\% = 0,0175$ ✓✓1.2 There are 4 payments per year: $5,5 - 4 = 22$ interest intervals ✓✓1.3 $A = P(1+r)^n$ ✓

$$A = 2000(1 + 0,0175)^{22} \quad \checkmark\checkmark\checkmark$$

$$A = R2929,46$$

1.4 $A - P =$ interest amount

$$A - P = 2929,46 - 2000 = R929,46 \quad \checkmark\checkmark$$

[10]**QUESTION 2**2.1 Formula to use $A = 5000(1 + 0,085)$

a The table: ✓✓✓✓

| Year (n) | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 |
|------------|-----|------|---------|---------|---------|---------|---------|---------|
| Investment | 000 | 5425 | 5886,12 | 6386,45 | 6929,29 | 7518,28 | 8157,34 | 8850,71 |
| Interest | 0 | 425 | 886,12 | 1386,45 | 1929,29 | 2518,28 | 3157,34 | 3850,71 |

b. R6929,29 ✓

c. $3850,71 - 3157,34 = R693,37$ ✓✓

d. The interest is compounded and increases from period to period because in each period it is calculated not only on the principle value, but on the interest from the previous periods as well. ✓✓✓

[10]2.2 a. Option A: $A = 1500(1 + 0,083 \times 3)$ ✓✓✓

$$A = R1860,00 \quad \checkmark$$

Option B: $A = 1500(1 + 0,0075)^3$ ✓✓✓

$$A = R1863,45 \quad \checkmark$$

This means that option B has the higher return. ✓

b. As interest is added every year, option B adds interest to the interest whereas option A only adds the interest on the initial amount. ✓✓✓

[12]

SECTION C: HOMEWORK

QUESTION 1

Use the formula for compound interest as we know it: $A = P(1 + \frac{r}{100})^n$ and convert it into a formula, which calculates interest compounded quarterly. (Hint! The interest rate needs to be divided and the term needs to be multiplied by the same number.) (4)

QUESTION 2

Janet borrows money from the bank. She borrows R12 000,00. Calculate the value of the loan after 5 years if the interest rate is

- a. 4% per annum compounded monthly. (5)
- b. 4,5% per annum compounded yearly. (3)
- c. 5% simple interest. (3)
- d. 12% compounded once every 30 months. (3)

[14]

QUESTION 3

Maria is twenty-five years old. She has just started a job and earns a good salary. Her parents have told her that investing at an early age will ensure financial stability in her old age. She decides to put R1 500,00 per month into a pension fund that has a yearly interest rate of 12% per year.

Use the annuity formula: $A = R \frac{(1+r)^n - 1}{r}$

- a. If the average retirement age is 60, what will the value of her annuity be if she continually makes the same payment for the next 35 years? (5)
- b. How much money will Maria pay into the annuity? (2)
- c. What is the percentage gain over the total period of time? (2)
- d. Maria has her heart set on buying a holiday house when she retires. It will probably cost R600 000,00 by the time she retires. Will she be able to afford it? (1)

Use the payments formula: $R = \frac{Ar}{(1+r)^n - 1}$

- e. What would Maria's periodic payments have to be at the same interest rate if she wants to retire with a lump sum of R850 000,00. (5)

[15]

SECTION D: SOLUTIONS TO HOMEWORK**QUESTION 1**

General Formula: $A = P\left(1 + \frac{r}{100}\right)^n$

New interest rate: $\frac{r}{4}$ ✓ New term: $n \cdot 4$ ✓

New Formula: $A = P\left(1 + \frac{r/4}{100}\right)^{4n}$ ✓ ✓ (4)

QUESTION 2

- a. New rate: $4/12 = 0,3333\%$ ✓
 New term: 12 times 5 = 60 ✓

$$A = 12000\left(1 + \frac{0,3333}{100}\right)^{60}$$

✓ ✓ ✓ (5)

$$= R1465196$$

- b. Use unchanged formula

$$A = 12000(1 + 0,045)^5$$

✓ ✓ ✓ (3)

$$= R14954,18$$

- c Simple Interest Formula

$$A = 12000 + 12000 \cdot 0,05 \cdot 5$$

✓ ✓ ✓ (3)

$$= R15000,00$$

- d The rate is given as 12% for 30 months.
 There are only two sets of 30 months in five years, so the term is 2

$$A = 12000(1 + 0,12)^2$$

✓ ✓ ✓ (3)

$$= R15052,80$$

[14]

TOPIC 2: TAX, INFLATION, INTEREST, EXCHANGE RATES, CURRENCY FLUCTUATIONS

! Teacher Note: This section can be confusing. BUT these marks are easy to get if the learners know the calculations to work out VAT etc. The learners must be aware of what is being asked and before answering the questions, determine the formula to use. The

LESSON OVERVIEW

1. Introduction of lesson: 5 minutes
2. Typical exam questions: 30 minutes
3. Solutions: 25 minutes

SECTION A: TYPICAL EXAM QUESTIONS

QUESTION 1

Adam earns R160 000,00 per year (per annum).

- 1.1 Which tax bracket does Adam fall into?
- 1.2 How much tax does Adam have to pay per year?
- 1.3 How much tax does Adam have to pay per month?

[6]

QUESTION 2

On 25 June 2007 XYZ-Trading sells some items to Mr Jackson, a regular customer. He is going on a tour of South Africa and is buying supplies for the trip. This is his 26th purchase from XYZ-Trading. On his tour, Mr Jackson will also rent some property and has asked that the rent be added to the invoice for his purchases.

- | | |
|-----------------------------------|--|
| ❖ 1 sleeping bag – R255,90 | ❖ 5 nights rental of a hut in the mountains – R3190,00 |
| ❖ 1 large raft – R895,99 | ❖ 6 litres of long life milk – R36,50 |
| ❖ 1 barrel of petrol – R563,95 | ❖ 1 road map – R69,95 |
| ❖ 1 bag of maize meal – R29,90 | ❖ 1 gas cooker – R285,90 |
| ❖ 1 dozen eggs – R13,50 | |
| ❖ 1 litre of cooking oil – R12,45 | |
| ❖ 2,5 kg of meat – R234,55 | |

All prices above are given excluding VAT. The address for XYZ-Trading is 4 Northlock Road, Kennely, 2294. Their VAT No is 739167409. Mr Jackson lives at 12 Mendel Street, Benoni, 2391.

- 2.1 List all items that have a Zero-rating for VAT. (5)
- 2.2 List all items that need to have VAT added. (5)
- 2.3 Which is the VAT exempt item? (1)

- 2.4 Calculate the total amount excluding VAT payable by Mr Jackson. (2)
- 2.5 Calculate the total VAT due by Mr Jackson. (3)
- 2.6 What is the invoice value? (2)
- 2.7 VAT is part of the money that the government spends on various services for the public. Name three services that benefit Mr Jackson on his tour around the country. (2)
- [20]

SECTION B: SOLUTIONS AND HINTS TO SECTION A
QUESTION 1

- 1.1 According to the above table he falls into row three of the taxable income:
130 001 – 180 000 : 26 900 + 30% of the amount above R130 000
 (1M for calculation) ✓ (1)
- 1.2 From 0 – 80 000 the income is taxed at 18%.
 $\frac{18}{100} \times 80000 = 14400$ ✓
 From 80 001 – 130 000 the income is taxed at 25%.
 $\frac{25}{100} \times (130000 - 80000) = 0,25 \times 50000 = 12500$
 $14400 + 12500 = 26900$ **This is the bulk value in row three**
- The rest of the income tax is the portion is taxed at 30%:
 $\frac{30}{100} \times 30000 = 9000$ ✓
The total tax payable per year is:
 $26900 + 9000 = R35900$ ✓
 (3M for calculating tax per year) (3)
- 1.3 The tax payable per month is:
 $35900 \div 12 = R2991,67$
 (2M calculating tax per month) ✓✓ (2)
- [6]**

QUESTION 2

- 2.1 Zero-rated items:
 1 barrel of petrol✓
 1 bag of maize meal✓
 1 dozen eggs✓
 1 litre of cooking oil✓
 6 litres of long life milk✓
- 2.2 VAT items:
 1 sleeping bag✓
 1 large raft✓
 2,5kg of meat✓
 1 road map✓
 1 gas cooker✓
- 2.3 VAT exempt item
 5 nights rental of a hut in the mountains✓ (1)
- 2.4 The total value excluding VAT
 $255,90 + 895,99 + 563,95 + 29,90 + 13,50 + 12,45 + 234,55$ ✓✓
 $+ 3190,00 + 36,50 + 69,95 + 285,90 = 5588,59$ (2)
- 2.5 VAT
 $(255,90 + 895,99 + 234,55 + 69,95 + 285,90) \cdot \frac{14}{100} = (1742,29) \cdot 0,14 = 243,92$ ✓✓✓ (3)
- 2.6 Invoice value:
 $(5588,59 + 243,92) = R5832,51$ ✓✓ (2)
- 2.7 Mr Jackson uses the road, maybe even National Parks. The police maintain safety on the roads he travels, and a government hospital could take care of him in case of an emergency. ✓✓ (2)

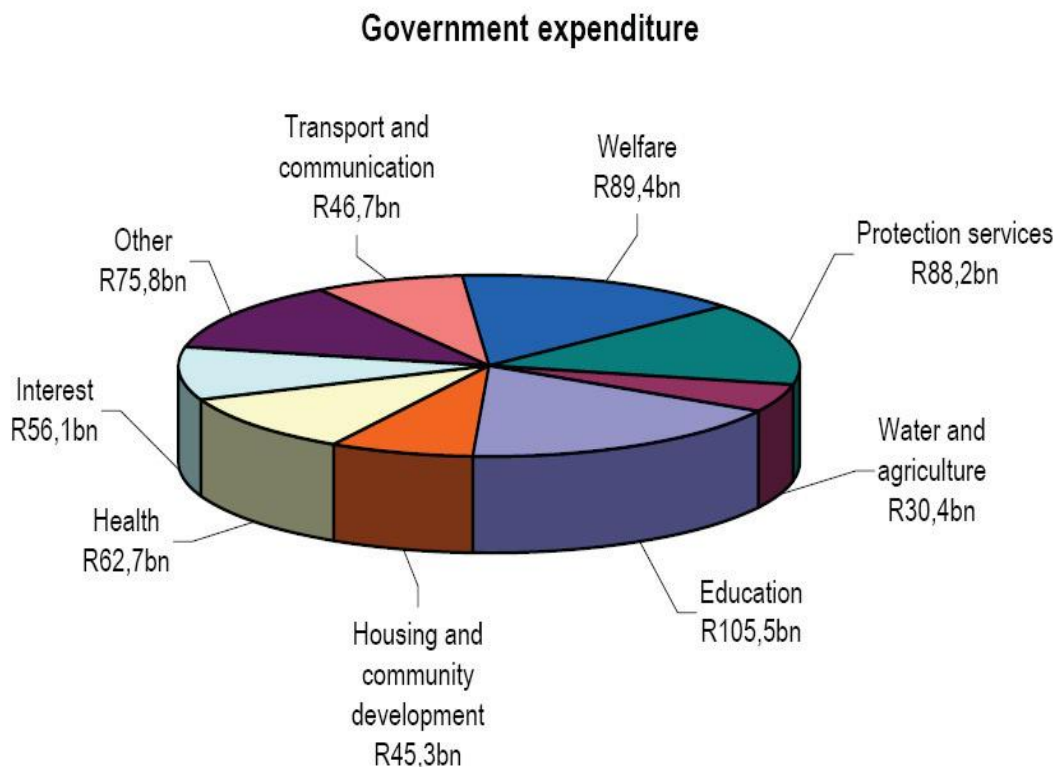
[20]

SECTION C: HOMEWORK

QUESTION 1

The pie chart below was published on: <http://www.finance.gov.za>.

It gave South African citizens a broad indication of how the government planned to spend their revenue on certain sectors in the period 2007/2008.



<http://www.finance.gov.za>

Please Note: R56,1 bn is 56,1 billion Rand, i.e. R56 100 000 000,00.

- 1.1 What is the total amount the government intends on spending? (2)
- 1.2 The previous year the government expenditure amounted to a total of R472,7bn and the breakdown was given as in the table below.
 Calculate how many billion Rand were allocated to the education sector. (2)

TABLE 1 Adapted from www.finance.com

| Government expenditure 2006/2007 | |
|---|-------|
| Education | 17,8% |
| Housing and community development | 6,8% |
| Health | 10,5% |
| Interest | 10% |
| Other | 12% |
| Transport and communication | 6,7% |
| Welfare | 15,5% |
| Protection Services | 15,3% |
| Water and Agriculture | 5,3% |

1.3. Compare the government expenditures of 2006/2007 to those of 2007/2008.

- 1.3.1 In which sector is the highest percentage difference? (2)
- 1.3.2 Where the percentages have increased, what would the impact be? (2)
- 1.3.3 Where the percentages have decreased, what would the impact be? (2)
- [10]

QUESTION 2

Thomas has just come back from a trip overseas. Four weeks before he departs for America, the exchange rate is R7,14 to the dollar. One week before he departs the exchange rate is R7,52 to the dollar.

- 2.1 Thomas exchanged R8 500,00 four weeks before he left, how many dollars did he receive? (3)
- 2.2 If Thomas exchanged the same amount of rands one week before departure, how many dollars would he have? (3)
- 2.3 How much money would he gain by exchanging his money early? (2)
- 2.4 If Thomas buys a pair of pants for \$43,95, how many rands would he spend? Calculate for both exchange rates. (4)
- 2.5 Describe what happens to the cost of foreign goods when the exchange rate strengthens against the dollar? (2)
- [14]

SECTION D: SOLUTIONS TO HOMEWORK

QUESTION 1

- 1.1 Total amount to spend:
 $89,4 + 88,2 + 30,4 + 105,5 + 45,3 + 62,7 + 56,1 + 75,8 + 46,7 = 600,1 \text{ bn}$ ✓✓
 (2)
- 1.2 Education 2006/2007:
 $17,8\% \text{ of } R474,7 \text{ bn} = \frac{17,8}{100} \cdot 474,7 = R84,4966 \text{ bn}$ ✓✓ (2)
- 1.3.1 Transport: $7,8\% - 6,7\% = 1,1\%$ ✓✓ (2)
- 1.3.2 The government lays more emphasis on that sector. This means they are giving more money to projects that aid that sector. This will impact the community as there will be more funds available for specific areas of development. ✓✓ (2)
- 1.3.3 The government lays less emphasis on that sector than before. This means that the projects that needed to have been financed in the previous year, may have been completed, or that the government wishes to balance funds better between the sectors. ✓✓ (2)
- [10]**

QUESTION 2

- 2.1 Thomas exchanged R8 500,00 at an exchange rate of R7,14.
 $R8500 \div 7,14 = R1190,48$ ✓✓✓ (3)
- 2.2 Thomas now exchanges at a rate of R7,52 to the Dollar.
 $R8500 \div 7,52 = R1130,32$ ✓✓✓ (3)
- 2.3 $R1190,48 - R1130,32 = R60,16$ ✓✓ (2)
- 2.4 At R7,14 the pants cost: $7,14 \cdot 43,95 = R313,80$ ✓✓
 At R7,52 the pants cost: $7,52 \cdot 43,95 = R330,50$ ✓✓ (4)
- 2.5 As the rand strengthens against the dollar foreign goods become cheaper, i.e. we spend less rand on the same item. This can cut our costs significantly. ✓✓ (2)
- [14]**

SESSION 2: TOPIC 1: LENGTH, DISTANCE, PERIMETERS AND AREAS OF POLYGONS

LESSON OVERVIEW

1. Introduce session: 5 minutes
2. Typical exam questions: 35 minutes
3. Solutions and hints: 20 minutes

Teacher Note: It is important for the learners to know their formulae as this is often where problems arise. If they get the first step wrong, the whole answer will be wrong. They must know their shapes, and which formulae correspond.

SECTION A: TYPICAL EXAM QUESTIONS

Here are some helpful tables:

**** Remember 1000cm = 1m**

| When you know length & distance | Multiply by | To find |
|---------------------------------|-------------|------------------------|
| millimetres | 0,04 | inches (in) |
| centimetres | 0,4 | inches (in) |
| metres | 1.1 | yards (yd) |
| square centimetres | 0,16 | square inches (sq. in) |
| square metres | 1.2 | square yards (sq. yd) |

| IMPERIAL | METRIC |
|-------------------------------|------------|
| MEASUREMENTS OF LENGTH | |
| 1 inch | = 2,54 cm |
| 0,39 inches | = 1 cm |
| 12 inches = 1 foot | = 30,48 cm |
| 36 inches = 1 yard | = 91,44 cm |
| 3 feet = 1 yard | = 91,44 cm |
| 39,37 inches | = 1 metre |
| 1760 yards = 1 mile | = 1,6km |
| 0,625 miles | = 1 km |
| 5 miles | = 8km |
| 0,54 nautical miles (at sea) | = 1 km |

QUESTION 1

1.1. Answer the following referring to the above conversion tables and what you remember about conversions within the metric system

- a) 1 km = _____ m
A. 1
B. 50
C. 1000
D. 1 000 000
- b) 20 inches = _____ cm
A. 50,08
B. 7,87
C. 20
D. 40
- c) 3 metres = _____ feet
A. 3
B. 9,84
C. 118,11
D. 39,37
- d) 250 miles = _____ km
A. 563,3
B. 400
C. 156,25
D. 750
- e) Convert 7,5 nautical miles to km.
A. 4,05
B. 8,04
C. 7,5
D. 13,89

(5)

1.2. Belinda has moved from the USA to South Africa and brought her washing machine, refrigerator and dishwasher with her. The dimensions on the box are given in imperial units and the space in her kitchen is given in SI (metric) units.

Convert all imperial units to SI units to see if the appliances will fit in the spaces provided. (7)



Teacher Note: Remind learners to use 1 inch = 2,54 cm

| APPLIANCE | DIMENSIONS -IMPERIAL (USA) | SPACE AVAILABLE SA |
|---------------------------------|----------------------------|--------------------|
| Washing machine : length | 3 feet 7 inches | 90 cm |
| depth | 34 inches | 90 cm |
| height | 39 inches | 1 m |
| Refrigerator : length | 39 inches | 1 m |
| depth | 2 feet 8 inches | 90 cm |
| height | 69 inches | 1,8 m |
| Dishwasher : length | 35 inches | 1,1 m |
| depth | 35 inches | 90 cm |
| height | 39 inches | 1 m |

[12]

QUESTION 2

Teacher Note: Learners must remember and use this formula: $s = \frac{d}{t}$

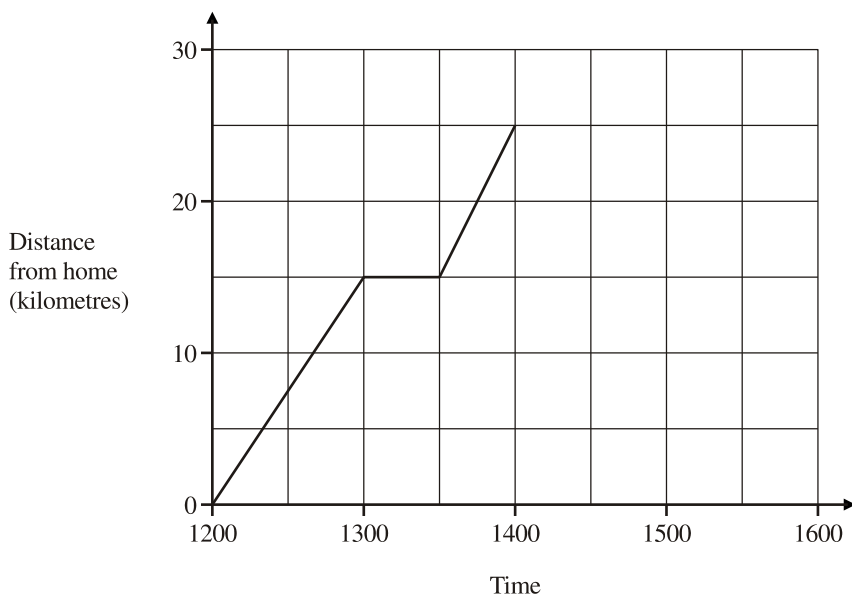
Answer the following **using the distance table**:

2.1

- How many kilometres would you travel if you went from Durban to Underberg?
 - 100km
 - 344km
 - 99km
 - 304km
- Which is the quicker route from Durban to Kokstad, via Pietermaritzburg or via Port Shepstone?
 - Via Port Shepstone
 - Via Pietermaritzburg
- Which city **on the table** is closest to Howick?
 - Kokstad
 - Hluhluwe
 - Mooi River
 - Pietermaritzburg
- Which city **on the table** is furthest away from Howick?
 - Ulundi
 - Vryheid
 - Dundee
 - Richards Bay

(4)

2.2. Elizabeth went for a cycle ride. The distance-time graph shows her ride.



She set off from home at 12:00 and had a flat tyre at 14:00. During her ride, she stopped for a rest.

- a) At what time did she stop for a rest? (1)
- b) At what speed did she travel after her rest? Give your answer in km/h. (2)

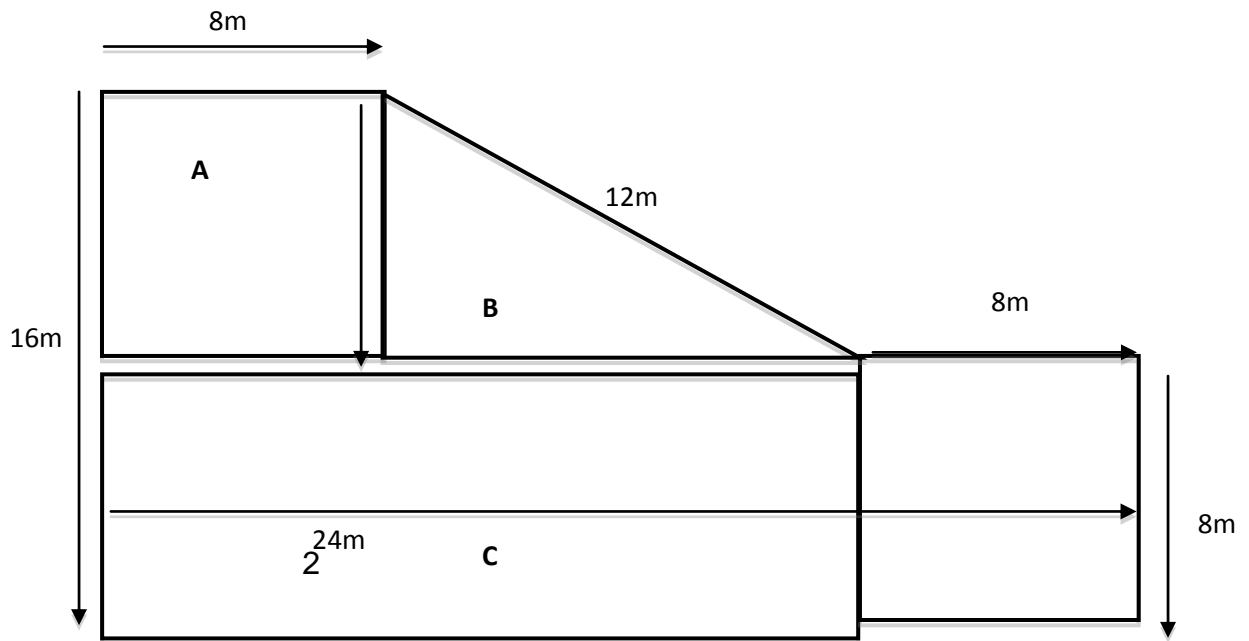
$$\text{Speed} = \text{distance} \div \text{time}$$

- c) What total distance did she travel before she got a flat tyre? (1)
- [8]

QUESTION 3

- 3.1. Determine the perimeter of a soccer field if the length is 100m and the breadth is 50m. (2)
- 3.2. What is the perimeter of the building if the breadth is 20m and the length is 2362,2 inches. (3)

3.3. Look at the building plan below and calculate the following:



- a) Calculate the perimeter of A (2)
 - b) Calculate the perimeter of B (2)
 - c) Calculate the total perimeter (2)
- [11]

QUESTION 4

- 4.1. Calculate the area of the polygon if $a = 3\text{cm}$ and $s = 2\text{cm}$ (3)
 - 4.2. Take no note of what “a” is equal to in 4.1, calculate a if $P = 24\text{m}$; $A = 60\text{m}^2$; $s = 3$ (3)
- [6]

Learners must remember:: $\text{Perimeter} = sn$
 $A = \frac{aP}{2}$ $\text{Area} = \frac{\text{apothem} \times \text{Perimeter}}{2}$

SECTION B: SOLUTIONS AND HINTS TO SECTION A**QUESTION 1**

- 1.1. a) C. There are 1000 m in a km. ✓ (1)
 (To convert to a larger unit, move the decimal place to the left,
 divide by 10 each time)
 (To convert to a smaller unit, move the decimal place to the right
 multiply by 10 each time)
- b) A. 50,08 ✓ (1)
 1 inch = 2,54 cm
 so 20 inches = 20 X 2,54 cm
 = 50,08 cm
- c) B. 9,84 ✓ (1)
 1 m = 39,37 inches
 so 3m = 39,37 X 3 inches
 = 118,11 inches
 but 1 foot = 12 inches
 So: 3m = 118,11 ÷ 12 = 9,84 feet
- d) B. 400 ✓ (1)
 0,625 miles = 1 km
 1 mile = 1 ÷ 0,625 km
 = 1,6 km
 so 250 miles = 250 X 1,6
 = 400 km
- e) D. 13,89 ✓ (1)
 0,54 nautical miles = 1 km
 1 nautical mile = 1 ÷ 0,54 km
 = 1,8518...km
 so 7,5 nautical miles = 7,5 X 1,85
 = 13,89 km [5]

1.2. Washing machine height = 109,22 cm Therefore, will not fit ✓

Refrigerator length = 99,06 cm OK ✓
 depth = 81,28 cm OK ✓
 height = 175,26 cm Will just fit ✓

Dishwasher length = 88,9 cm OK ✓
 depth = 88,9 cm OK ✓
 height = 99,06 cm OK Will fit ✓

(7)
[12]

QUESTION 2

2.1.

- a) C. 199km ✓ (1)
- b) A. via Port Shepstone 255km ✓
(via Pietermaritzburg is 268 km) (1)
- c) D. Pietermaritzburg 18km ✓ (1)
- d) A. Ulundi 330 km ✓ (1)
- [4]

2.2.

- a) 13:00 ✓ (1)
- b) $10\text{km} \div \frac{1}{2}\text{ hour} = 20\text{ km/h}$ ✓ (2)
- c) 25km ✓ (1)
- [4]
- [8]

QUESTION 3

3.1. $P = 2L + 2$

$$P = 2(100) + 2(50) \quad \checkmark \quad (1\text{M for correct calculation})$$

$$P = 200 + 100$$

$$P = 300\text{m} \quad \checkmark \quad (1\text{M for correct answer}) \quad (2)$$

3.2. $P = 2L + 2B$

$$L = 2362,2 \div 39,37\text{inches} = 60\text{m} \quad \checkmark \quad (1\text{M for conversion from inches to meters})$$

$$\text{Therefore: } P = 2(60) + 2(20)$$

$$P = 120 + 40 \quad \checkmark \quad (1\text{M correct calculation})$$

$$P = 160\text{m} \quad \checkmark \quad (1\text{M correct answer}) \quad (3)$$

3.3.

a) A: $P = 2L + 2B$
 $P = 2(8) + 2(4) \quad \checkmark \quad (1\text{M correct calculation})$
 $P = 24\text{m} \quad \checkmark \quad (1\text{M correct answer}) \quad (2)$

b) B: $P = \text{side 1} + \text{side 2} + \text{side 3}$
 $P = 8 + 12 + \text{side 3} \quad (1\text{M correct calculation})$
 $\text{Side 3} = 24 - 8 - 8 = 8\text{m} \quad \checkmark \quad (\text{Calculation of side 3; take bottom side})$
 $\text{Subtract the two square sides of 8 and 8})$
 $\text{Therefore: } P = 8 + 12 + 8$
 $P = 28\text{m} \quad \checkmark \quad (1\text{M correct answer}) \quad (2)$

c) Total Perimeter: $P = 16 + 8 + 12 + 8 + 8 + 24 \quad \checkmark \quad (1\text{M adding all sides together})$
 $P = 76\text{m} \quad \checkmark \quad (1\text{M correct answer}) \quad (2)$

[11]

QUESTION 4

$$4.1 \quad A = \frac{aP}{2} \quad (1M \text{ correct calculation})$$

$$P = sn = 2 \times 8 = 16\text{cm} \quad \checkmark \quad (1M \text{ calculation of perimeter})$$

$$\text{Therefore: } A = \frac{3 \times 16}{2} \quad \checkmark$$

$$A = 24\text{cm}^2 \quad \checkmark \quad (1M \text{ correct answer}) \quad (3)$$

$$4.2. \quad A = \frac{aP}{2}$$

$$60 = \frac{a \times 24}{2} \quad \checkmark \quad (1M \text{ correct calculation})$$

$$2 \times 60 = a \times 24$$

$$\frac{120}{24} = a \quad \checkmark \quad (1M \text{ correct changing of variables to calculate a})$$

$$\text{Therefore: } a = 5\text{cm} \quad (1M \text{ correct answer}) \quad (3)$$

[6]**SECTION C: HOMEWORK****QUESTION 1**

a) Convert 3,5 metres to centimetres. (1)

b) Express 650 millilitres in litres. (1)

[2]**QUESTION 2**

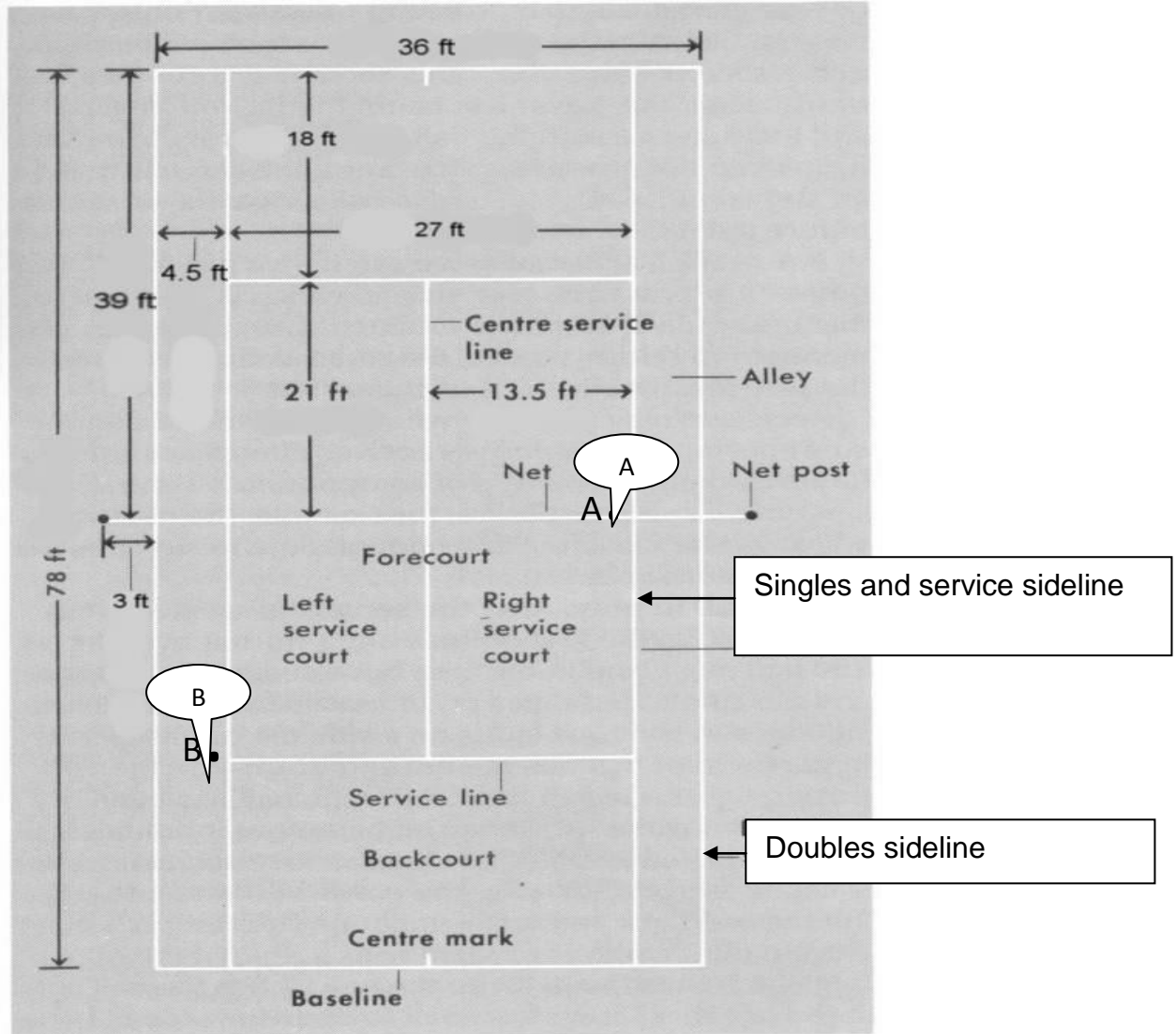
A trailer is 180 cm in length 1,2 m in width and 80 cm in height. (1000cm = 1m)

What is the perimeter of the trailer?

$$P = 2(l + b) \quad [2]$$

QUESTION 3

- 3.1. From the plans below, calculate the perimeter, in feet, of the doubles tennis court. (2)
- 3.2. Calculate the area of the tennis court in feet. (3)



[5]

QUESTION 4

Calculate the area of the polygon if $a = 6\text{cm}$ and $s = 5\text{cm}$ [3]

QUESTION 5

Calculate the perimeter of a square if one of the sides is 4km long. [3]

SECTION D: SOLUTIONS TO HOMEWORK

1. a) 350 cm ✓
b) 0,65 litres ✓ [2]
2. $P = 2(0,18 + 1,2)$ ✓ (1M converting 180cm = 0,18m)
 $P = 2,76m$ ✓ (1M correct answer using the perimeter formula) [2]
- 3.1. $P = 2L + 2B$
 $P = 2(78) + 2(36)$ ✓ (1M correct calculation)
 $P = 228 \text{ ft}$ ✓ (1M correct answer using the perimeter formula) (2)
- 3.2. $A = L \times B$ ✓ (1M using correct formula for area)
 $A = 78 \times 36$ ✓ (1M correct substituting of digits)
 $A = 2\ 808 \text{ ft}$ ✓ (1M correct answer using "feet") (3)
[5]
4. If $a = 6$ and $s = 5$
 $A = \frac{aP}{2}$ ✓ (1M correct formula using correct P, $P = sn$)
 $A = \frac{6(5 \times 8)}{2}$ ✓ (**Remember:** a = apothem; s = length of each side;
 n = number of sides; P = Perimeter)
 $A = \frac{240}{2}$ (1M correct substitution)
 $A = 120$ ✓ (1M correct answer) [3]
5. $P = 4L$ ✓
 $P = 4(4)$ ✓
 $P = 16km$ ✓ (1M correct answer) [3]

TOPIC 2: SURFACE AREA AND VOLUME

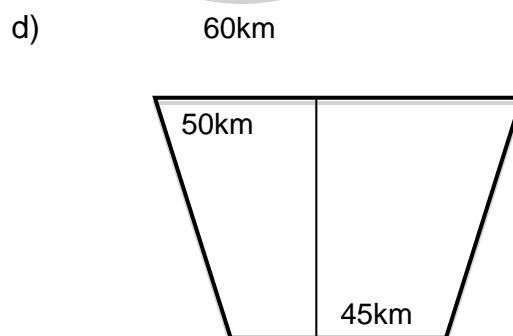
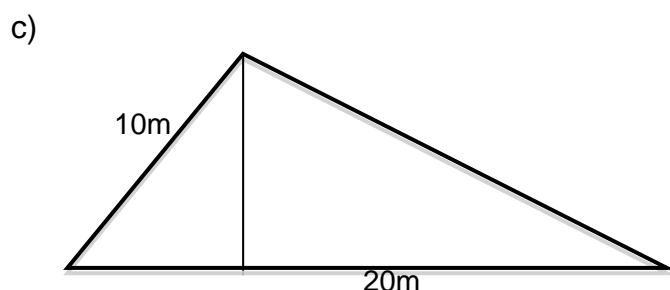
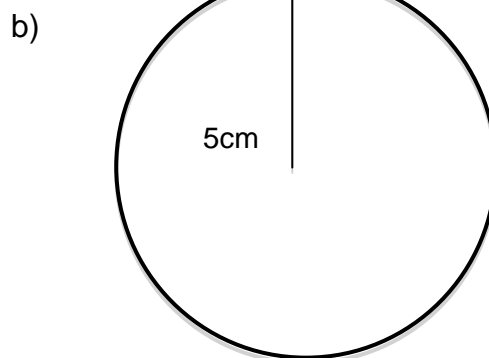
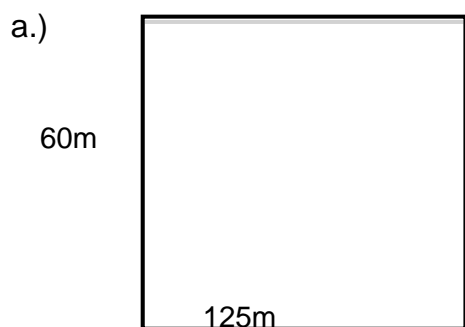
Teacher Note: Learners must learn the formulae and know how to do the calculations. They tend to battle with the Theorem of Pythagoras, so ensure that they are familiar with the base concept before proceeding on to the exercises. Ensure that the learners understand the difference between surface area and volume. They tend to get confused with the calculations for volume in circular cylinders. Learners must ensure that they begin with the correct formulae, and that they substitute the correct values where they should be.

LESSON OVERVIEW

1. Introduction of lesson: 5 minutes
2. Typical exam questions: 30 minutes
3. Solutions: 25 minutes

SECTION A: TYPICAL EXAM QUESTIONS**QUESTION 1**

1.1. Calculate the areas of the following shapes:



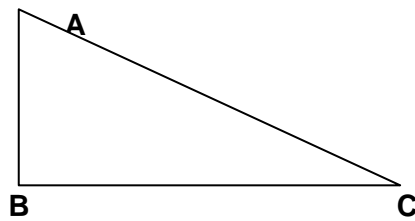
(8)

1.2 The area of a circle is given by $A = \pi r^2$. If the area of a circle is 153.94cm^2 , what is the radius? (4)

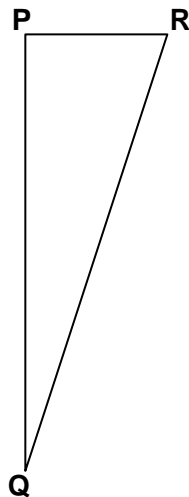
1.3 If the area in 1.2 is doubled, what would the radius be? (3)
[15]

QUESTION 2

2.1 Calculate the length of the hypotenuse in the triangle shown below, if $AB = 2\text{m}$ and $BC = 6\text{m}$ (3)



2.2. Calculate the length of side PQ if $QR = 10\text{cm}$ and $PR = 4\text{ cm}$ (3)



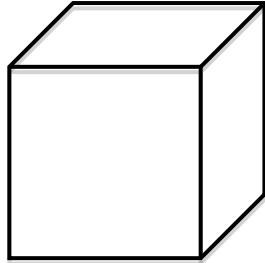
[6]

QUESTION 3

Calculate the surface areas of the following:

3.1 Rectangular prism

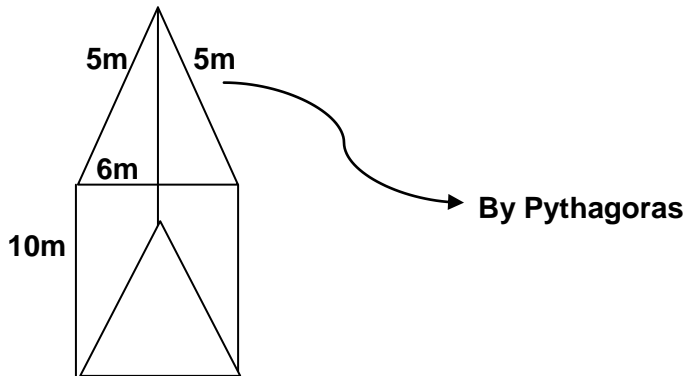
Find the surface area of a cardboard box shown below if the length is 12m, the breadth is 5m and the height is 8m.



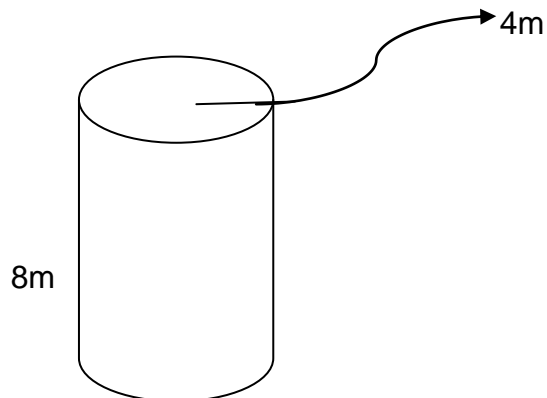
Each side is a rectangle so we will use the formula $A = \text{Length} \times \text{Breadth}$, 6 times as there are 6 sides in total (2)

3.2 Triangular prisms

A triangular prism consists of 2 triangles (top and bottom), 2 rectangles (sides) and 1 rectangle (front) (4)



3.3 Circular prisms or Cylinders



A cylinder consists of 2 circles (top and bottom) and 1 rectangle. Imagine the paper taken off a can of beans

SECTION B: SOLUTIONS AND HINTS TO SECTION A

QUESTION 1

1.1)

a) $A = BL$

$A = 60 \times 125$

(1M correct calculation)

$A = 7\,500\text{m}^2$

(1M correct answer and unit)

(2)

b)

$A = \pi r^2$

$A = 3,14 \times 5^2$

(1M correct calculation)

$A = 78,5\text{cm}^2$

(1M correct answer and unit)

(2)

c)

$A = \frac{bh}{2}$

$A = \frac{20 \times 10}{2}$

(1M correct calculation)

$A = 15\text{m}^2$

(1M correct answer and unit)

(2)

d)

$A = \frac{h(b_1 + b_2)}{2}$

$A = \frac{50(60 + 45)}{2}$

(1M correct calculation)

$A = \frac{50 \times 105}{2}$

$A = 2\,625\text{km}^2$

(1M correct answer and unit)

(2)

1.2)

$A = \pi r^2$

$\pi r = 153,94$

(1M correct calculation)

$r^2 = 153,94 \div \pi$

(1M correct change of formula to work out r^2)

$r^2 = 49\text{cm}^2$

(1M correct calculation)

$r = 7\text{cm}$

(1M correct answer)

(4)

1.3)

$r^2 = 307,88 \div \pi$

(1M correct calculation)

$r^2 = 98\text{cm}^2$

(1M correct use of Pi)

$r = 9,89\text{cm}$

(1M correct answer)

(3)

[15]**QUESTION 2**

1. $2^2 + 6^2 = h^2$

$4 + 36 = h^2$

(1M correct calculation)

$40 = h^2$

$\sqrt{40} = h$

(1M correct calculation)

$6,3\text{m} = h$

(1M correct answer)

(3)

$$\begin{aligned}
 2. \quad Q^2 + 4^2 &= 10^2 \\
 PQ^2 + 16 &= 100 && (1M \text{ correct calculation}) \\
 PQ^2 &= 100 - 16 \\
 PQ^2 &= 84 \\
 PQ &= \sqrt{84} && (1M \text{ correct calculation}) \\
 PQ &= 9,2 \text{ cm} && (1M \text{ correct answer})
 \end{aligned}$$

(3)
[6]

QUESTION 3

$$\begin{aligned}
 1. \quad \text{Surface Area} &= 2(12 \times 8) + 2(12 \times 5) + 2(8 \times 5) \\
 &= 2(96) + 2(60) + 2(40) \\
 &= 392\text{m}^2
 \end{aligned}$$

(2)

2. **By Pythagoras:**

$$h^2 + 3^2 = 5^2$$

$$h^2 = 25 - 9$$

$$h^2 = 16$$

$$h = \sqrt{16}$$

$$h = 4\text{m}$$

TOTAL SURFACE AREA

$$= 2(1/2 \times b \times h) + 3(l \times b)$$

$$= 2(1/2 \times 6 \times 10) + 2(10 \times 5) + (10 \times 6)$$

$$= 2(30) + 2(50) + 60$$

$$= 220 \text{ m}^2$$

3. **TOTAL SURFACE AREA**

$$= 2(\text{Area of circle}) + \text{Area of rectangle}$$

$$= 2(\pi r^2) + l \times b$$

$$= 2(\pi \times 4^2) + (2\pi \times 4 \times 8)$$

$$= 301,59 \text{ m}^2$$

SECTION C: HOMEWORK

Kelly is busy building her new house. The length of the house is 11m and the width is 6,10m. The building is a double storey. The details below are found in her notebook.

| STAGE OF WORK | LABOUR COST |
|---|-------------|
| 1. Foundations | R5500 |
| 2. Building of walls below the top floor | R7000 |
| 3. Plastering of walls inside and outside below the top floor | R6000 |
| 4. Preparing for throwing the concrete on the top floor | R4500 |
| 5. Throwing of concrete on the top floor | R18000 |
| 6. Building of support columns | R4500 |
| 7. Roofing | R14000 |
| 8. Electrical installation | R3600 |
| 9. Building of walls on the top floor up to the roof | R9000 |
| 10. Plastering of walls inside and outside on the top floor | R11000 |

1.1 The length of the top floor is 11m, the width, including the balcony, is 7,60m and the thickness is 17cm.

(i) How wide is the balcony? (1)

These formulas may be used in the questions that follow

Volume of a rectangular prism = length \times width \times height

Volume of a cylinder = $\pi \times r^2 \times h$

(ii) Calculate the volume of the concrete used for the top floor. (3)

(iii) If the maximum load of concrete that a lorry can carry is 6m^3 , how many loads of concrete were delivered to pour the top floor? Give a reason for your answer. (4)

1.2 The balcony of the top floor is supported by cylindrical concrete columns. If the diameter of a cylindrical concrete column measures 50cm and the column is 2,4m high, how many cubic metres of concrete are needed in such a column? (4)

1.3 Kelly measures the height of the steps in her new home and finds that the distance between two consecutive steps is the same. The 1st step is 15cm above the floor, the 2nd step 30cm and the 3rd step is 45cm above the floor. What is the height of the 17th step above the floor? (2)

[14]

SECTION D: SOLUTIONS HOMEWORK**QUESTION 1**

- 1.1 i) 7,60 m \checkmark (1)
- ii) Volume = $11 \times 7,60 \times 0,17 \checkmark = 14,212 \text{ m}^3 \checkmark \checkmark$ (3)
(Remember to convert 17 cm to 0,17m)
- iii) $14,212 \div 6 = 2,36 \approx 3$ loads of concrete. $\checkmark \checkmark$
We have to round up as 2 loads of concrete will not be enough. $\checkmark \checkmark$ (4)
- 1.2 Diameter = 0,5 m So $r = 0,25\text{m} \checkmark$
Volume of a cylinder = $\pi \times r^2 \times h$
 $= \pi \times (0,25)^2 \times 2,4 \checkmark \checkmark$
 $= 0,47 \text{ m}^3 \checkmark$ (4)
- 1.3 15, 30, 45 \checkmark
 $17 \times 15 = 255 \text{ cm} \checkmark$ (2)
- [14]**