THE UNIQUE STAR MTC PRE PLE SET ONE 2024 MARKING SCHEME

TIPS TO ENSURE MAXIMUM SCORES IN MATHEMATICS

- Use neat and clear handwriting.
- Use correct units where applicable.
- Diagrams should be constructed or drawn using a pencil.
- Constant revision aids mastery of knowledge and skills.
- Good planning of solution and showing all relevant steps.
- Avoiding unnecessary crossing of work.
- Regular practice can improve speed and accuracy.

GUIDELINES FOR EXCELLENCY

- Accurate working.
- Thorough checking of steps to minimize errors.
- Check if the main question is answered.
- Logical planning of the solution.
- Correct interpretation of the question.
- Checking of units if properly used.

UNIQUE STAR MTC PRE PLE SET ONE 2024

Extracted from

Unique Upper Primary Mathematics Resource Book

By Sseggayi Benjamin Kasuka

Tel: 0703 078 891
0785 600 165

Qn. 1 **Work out:** $6 \div 3$

Observation

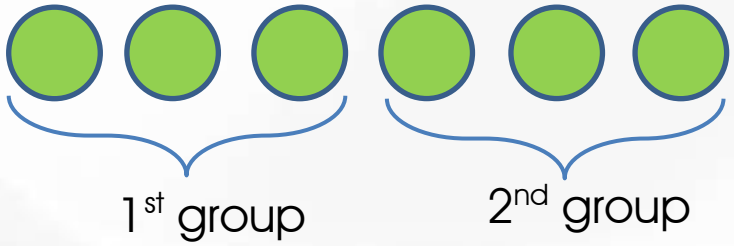
There is a likelihood of misinterpreting the division sign for an addition sign.

Suggestion

Emphasize critical study and different methods of division.
Help learners understand that division is repeated subtraction.
Teach learners that we divide to find groups of a number (divisor) that are contained in another number (dividend). A quotient is the result after division.

Solution

$$\begin{array}{r} 6 \\ \div 3 \\ \hline 2 \end{array}$$



So, 6 equals **2** groups of 3

Related problems

1. Amos was given a task to fill a 20 litre jerry can with water using a 4 litre container. How many such containers will he use?
2. There are 30 pupils in Primary Seven at KPT Primary School. Pupils formed 10 discussion groups. Find the number of pupils in each discussion group.
3. Group 100 hens into groups of 25. How many groups do you get?

Qn. 2 **Find the number expanded below:**
40000 + 9000 + 50 + 3

Observation

- A learner needed to add the given numbers vertically according to their place values

Suggestion

- Revise place values of digits in whole numbers up to 99,999,999
- Revise writing numbers in words and figures
- Revise expanding numbers using place values, values and powers of the given base.
- Help learners know the difference between place values and values.
(Place value is the position name of a digit in a number)
(Value = Digit × Place value). Display charts showing place values and values.
- Emphasis the "s" on place values e.g. Hundreds not Hundred

Solution

40000 + 9000 + 50 + 3

$$\begin{array}{r} 40000 \\ 9000 \\ 50 \\ +\quad 3 \\ \hline 49053 \end{array}$$

Qn. 3 Simplify: 5 – 2(h + 3)

Observation

- A learner needs first open brackets then simplify.

Suggestion

- Give learners enough problems involving collecting like terms in algebraic expressions with brackets.
- Help learners know the difference between algebraic expressions and equations.
- Help leaners understand that when opening brackets;
** a negative term changes all signs in the brackets.*
** a positive term does not change any of the signs in the brackets.*
** a term before the brackets, multiplies all the terms throughout the brackets.*
- Help learners identify like terms as terms with exactly the same letters.
- Teach learners that unlike terms cannot be added or subtracted.

Solution

5 – 2(h + 3)
5 – 2h – 6
5 – 6 – 2h
-1 – 2h

Related word problems

1. *Take away 5 – x from 7*
2. *Subtract 2(m – 4) from 2*
3. *Take away 3(2y + 1) from 2(4 – 5y)*

Qn. 4 Express $16\frac{2}{3}\%$ as a ratio.

Observation

- *A learner needs change the mixed number into an improper fraction then multiply the result by the value of 1% (1% = $\frac{1}{100}$). Change the resulting fraction to ratio.*

Suggestion

- *Help learners understand the meaning of the words: Percent and Percentage.*
  * *Percentage actually means "out of a hundred". It's a number that is used to express a fraction of 100. Take an example; in a school 40% of the pupils are boys. This means out of 100 pupils, 40 pupils are boys.*
- *Teach learners that to change a mixed fraction percentage, convert the mixed number into an improper fraction, then multiply by $\frac{1}{100}$ to remove the percent symbol.*

Solution

$$16\frac{2}{3}\% = \frac{50}{3} \times \frac{1}{100}$$
$$= \frac{1 \times 1}{3 \times 2}$$
$$= \frac{1}{6}$$
$$= 1:6$$

Qn. 5 Write CMXIV in Hindu Arabic numerals.

Observation

- A learner needs to write numbers in Roman numerals up to M

Suggestion

- Teach roman numerals comprehensively.

** Below are the letters used in Roman numerals*

Roman Numerals	I	V	X	L	C	D	M
Hindu Arabic numerals	1	5	10	50	100	500	1000

- Emphasize the use of capital letters.

- Give learners enough exercises about changing Roman numerals to Hindu Arabic numerals and vice versa.

- Give learners situations in real life situation where Roman numerals are applied.

- Display wall charts showing Roman numerals.

Solution

CM = 900
X = 10
IV = + 4
CMXIV = 914

Qn. 6 Find the square root of 144.

Observation

- A learner needs to find the number multiplied by itself to get 144.

Suggestion

- Help learners know the difference between a square number and a square root.

** A square number is the result when a number has been multiplied by itself.*

** A square root of a number is whatever number that can be multiplied by itself to equal the original number. E.g. The square root of 25 is 5.*

- Emphasize the steps taken while finding square roots of numbers.

1. Divide the given number into its prime factors.

2. Form pairs of prime factors such that both factors in each pair are equal.

3. Take one factor from each pair.

4. Find the product of the factors obtained by taking one factor from each pair.

- Revise square roots of common fractions and decimal fractions.

Solution

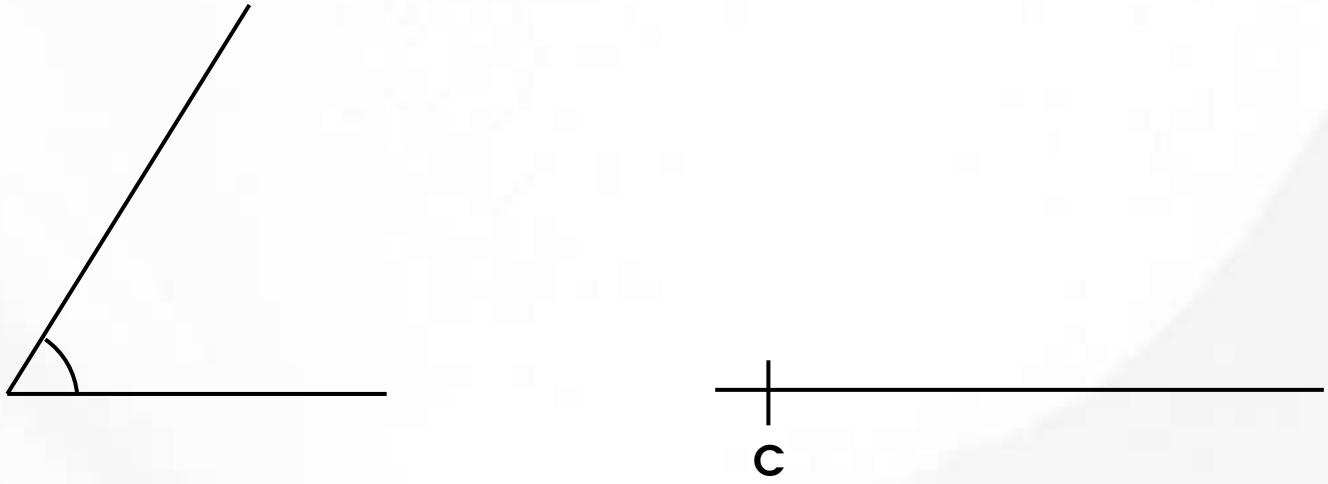
2	144
2	72
2	36
2	18
3	9
3	3
	1

$\sqrt{144} = \sqrt{(2 \times 2) \times (2 \times 2) \times (3 \times 3)}$

$\sqrt{144} = 2 \times 2 \times 3$

$\sqrt{144} = 12$

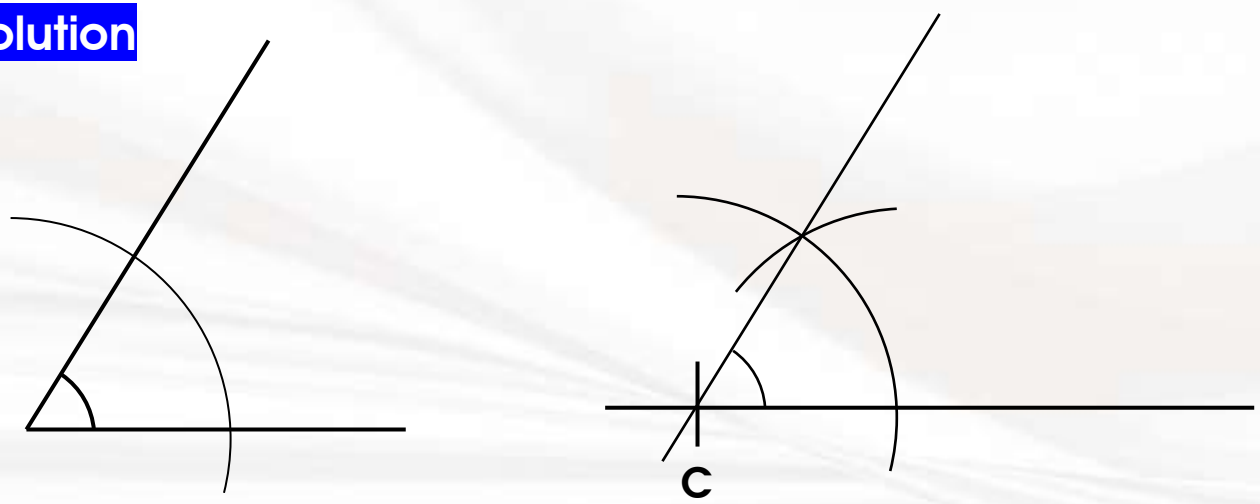
Qn. 7 **Using a ruler, a pencil and a pair of compasses only, copy the given angle onto point C.**



Suggestion

- *Help learners learn how to copy angles. Give them enough practicing exercises.*
- *Revise bisecting angles and constructing angles.*
- *Help learners know the difference between "draw" and "construct" as used in geometry.*
- *Revise bearing.*

Solution



Qn. 8 **Workout:** $8 \div \frac{2}{3}$ of 6

Observation

- *A learner needs to apply the rule of BODMAS to solve the given problem.*
- *There is a likelihood of misinterpreting "**O**" for Orders as "of" for multiplication.*

Suggestion

- *Help learners to understand that BODMAS is used when there is more than one operation in a mathematical expression.*
  * ***BODMAS** stands for **B**rackets, **O**rder, **D**ivision, **M**ultiplication / of, **A**ddition, **S**ubtraction.*
- *Emphasize that the "**O**" in BODMAS stands for Order of powers and roots.*
- *For this case 16 ÷ 2(2 + 2), emphasize the introduction of "×" immediately after operation is done in brackets as in the working below.*

$16 \div 2(2 + 2) = 16 \div 2(4)$

$= 16 \div 2 \times 4$

$= 8 \times 4$

$= 32$

- *Emphasis the change of "of" to multiplication sign (×) before carrying out any operation.*

Solution

$8 \div \frac{2}{3}$ of $6 = 8 \div \frac{2}{3} \times 6$

$= 8 \times \frac{3}{2} \times 6$

$= 4 \times 3 \times 6$

$= 72$

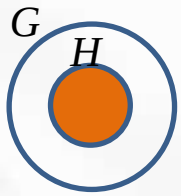
Qn. 9 **Given that X = {u, v, o, t, e}. Find the number of proper subsets in set X.**

Observation

- *A learner needs to apply the collect formula to find the number of proper subsets that can be obtained from set X*

Suggestion

- *Help learners understand the meaning of* ***Subset****: A set obtained from another set Or a set whose members are also members of another set.*
- *Use Venn diagrams to demonstrate subsets e.g.*



From the Venn diagram, the relationship between G and H is that, H is a subset of G.
The shaded region represents set H or H∩G

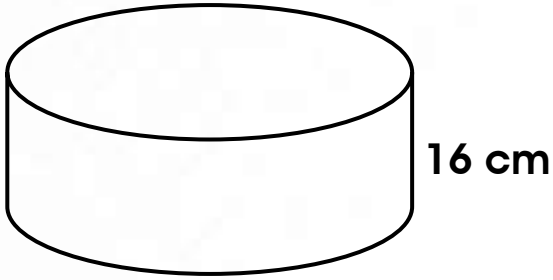
- *Guide learners derive the formula for finding proper subsets: $(2^n) - 1$*
- *Emphasize the proper use of brackets in the formula.*
- *Help learners understand the difference between improper and proper subsets.*

Solution

No. of proper subsets $= (2^n) - 1$
$= (2^5) - 1$
$= (2 \times 2 \times 2 \times 2 \times 2) - 1$
$= 32 - 1$
$= 31$ proper subsets

Set X has 31 proper subsets

Qn. 10 The base area of the container below is 770 cm^2.



Find the number of full bottles of volume 154 cm^3 each that can fill the container above with water.

Observation

- *A learner needs to find the volume of the container by the volume of each bottle.*

Suggestion

- *Help learners understand that volume = base area × height.*
- *Emphasize correct use of units.*
- *Guide learners to find number of bottles by dividing bigger volume by smaller volume.*
- *Revise volume of different solid shapes.*
- *Revise packing cubes or cylinders into boxes.*

Solution

$$\text{No. of bottles} = \frac{\text{Volume of the container}}{\text{Volume of each bottle}}$$

$$= \frac{770 \times 16}{154}$$

$$= 80 \text{ bottles}$$

Qn. 11 An overnight player that lasted for $4\frac{1}{5}$ hours, ended at 2:10a.m. At what time did it start?

Suggestion

- *Guide learners on how phrases a.m. and p.m. are used.*
- *Use various clock faces to help learners read and write time correctly in both 12 and 24 hour clocks.*
- *Emphasize the correct way of reading and writing time.*
- *Have learners identify any tricky points (midday and midnight) of the 24-hour clock in cooperative groups.*
- *Revise duration by using the same phrase i.e. starting and ending time is either a.m. or p.m.*
- *Revise duration by using different phrase. To find the duration from 11:00 p.m. to 2:00 a.m., subtract 11:00 from 12:00 then add the 2 hours to the result.*

12 : 00
-11 : 00 *1 hour + 2 hours = 3 hours*
1 : 00

** We subtract the starting time from 12 to find the time left to midnight/midday then add the time past midnight/midday.*

- *Lead the learners in finding the relationship between speed, time and distance.*

Solution

$\frac{1}{5} \times 60$ minutes $=$ 12 minutes

$4\frac{1}{5}$ hours $=$ 4 hours 12 minutes

12 : 00
- 4 : 12
7 : 48
+2 : 10
9 : 58 p.m.

It started at 9:58 p.m.

Qn. 12 Name the polygon whose exterior angle is 36°.

Suggestion

- *Guide learners on how to find the number of sides of a polygon.*
  * *To calculate the number of sides of a the polygon, divide 360° by the size of the exterior angle. For example, if the exterior angle is 60 degrees, then dividing 360° by 60° equals 6, which is the number of sides the polygon has.*
- *Guide learners understand that polygons are named according to the number of sides they have.*
- *Display a chart with polygons named according to the number of the sides they have.*

Polygon	Sides	Sum of interior angles	Shape	Each interior angle
Triangle	3	180°		60°
Quadrilateral	4	360°		90°
Pentagon	5	540°		108°
Hexagon	6	720°		120°
Heptagon (or Septagon)	7	900°		128.57...°
Octagon	8	1080°		135°
Nonagon	9	1260°		140°

No. of sides = 360° ÷ Exterior angle

Exterior angle = 360° ÷ Number of sides

Ext. angle + Int. angle at a vertex = 180°

Interior angle sum = 180°(n – 2)
"***n***" *represents the number of sides of a polygon.*

Solution

Number of sides
360° ÷ 36° = 10 sides
The polygon is a **decagon**.

Qn. 13 Find the next number in the sequence.

-1, -3, -6, -11, -18, ____

Observation

- A learner needs to identify the pattern used.

Suggestion

- Revise with learners work on patterns and sequences that was covered in P.3 to P.6

- Help learners form increasing and decreasing sequences.

- Revise types of numbers

** Whole numbers are 0, 1, 2, 3, 4, 5 …*

** Even numbers are 0, 2, 4, 6, 8 …*

** Odd numbers are 1, 3, 5, 7, 9 …*

** Square numbers are 1, 4, 9, 16, 25, 36, 49, 64, 81, 100 …*

** Cubic numbers are 1, 8, 27, 64, 125, 216, 343, 512, 729, 1000 …*

** Triangular numbers 1, 3, 6, 10, 15, 21, 28, 36, 45, 55 …*

** Prime numbers are 2, 3, 5, 7, 11, 13, 17, 19 …*

** Composite numbers are 4, 6, 8, 9, 10, 12, 14, 15, 16, 18, 20, 21 …*

- Guide learners to form patterns and sequences using: composite, triangular, square, cubic, prime, odd and even numbers.

- Guide learners to define and give examples of composite, triangular, square, cubic, prime, odd and even numbers.

- Revise divisibility tests of numbers.

- Give learners mental Mathematics and ample time to explore patterns and sequences games, brain teasers, puzzles and quizzes.

Solution

-1, -3, -6, -11, -18, -29

-2 -3 -5 -7 -11

Qn. 14 Sandra bought $1\frac{1}{2}$kg of rice at sh. 2500 for every 750 grammes. Calculate the amount of money, Sandra spent on rice.

Observation

- *A learner needs to find groups of 750 g in $1\frac{1}{2}$ kg after which is multiplied by the cost of each group of 750 g.*

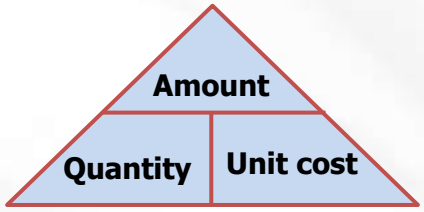
Suggestion

- *Revise changing kg to g.*
- *Give learners much practice about dividing mass. For example; finding the number of 450 g sachets that are contained in 9 kg. Here, first change the kg to g then divide as shown in the solution below:*

  9kg = (9 × 1000) g

  = 9000 g

  9000 g ÷ 450 g = 20 sachets
- *Revise finding unit cost, quantity and amount.*



Amount = Quantity × Unit cost

Quantity = Amount ÷ Unit cost

Unit cost = Amount ÷ Quantity

Solution

$1\frac{1}{2} \div \frac{750}{1000} \times$ sh 2500

$\frac{3}{2} \times \frac{1000}{750} \times$ sh 2500

Sh 5000

Qn. 15 Find the highest common factor (HCF) of 18 and 24.

Observation

- *A learner needs to find the largest number that can divide either 18 or 24 leaving no remainder.*

Suggestion

- *Help learners know the difference between LCM and HCF/GCF.*
- *Teach learners the meaning of the term "factor"*
  * *A factor is a number that divides the given number evenly or exactly, leaving no remainder. For example; the factors of 12 are*

  *12÷1 = **12***
  *12÷2 = **6***
  *12÷3 = **4***
  *12÷4 = **3***
  *12÷6 = **2***
  *12÷12 = **1***

  A set of factors of 12 is {1, 2, 3, 4, 6, 12}
- *Give learners situations in real life where GCF/HCF is applied.*
- *Guide learners to find GCF/HCF by prime factorizing the given numbers.*

Solution

2	18	24
3	9	12
	3	4

$HCF = 2 \times 3$

$HCF = 6$

Qn. 16 Solve: 3m = 5(finite 7)

Observation

- *A learner needs to carry out basic operations of clock arithmetic to solve the given problem.*

Suggestion

- *Emphasize the digits used in finite 7*
  **(0, 1, 2, 3, 4, 5, 6)*
- *Use different approaches to discuss the steps followed when carrying out basic operations on clock arithmetic.*
- *Teach learners to find equivalent whole numbers in finite systems.*
  ** To find the next equivalent numbers, keep on adding the finite to the given number. Given 3(finite 5), the next equivalent whole numbers are:*
  3+ 5 = 8
  8+5 = 13
  13+5 = 18
  18+5 = 23
  3(finite 5) = 8, 13, 18, 23 ...

Solution

$3m = 5(\text{finite } 7)$

$\frac{3m}{3} = \frac{5}{3}(\text{finite } 7)$

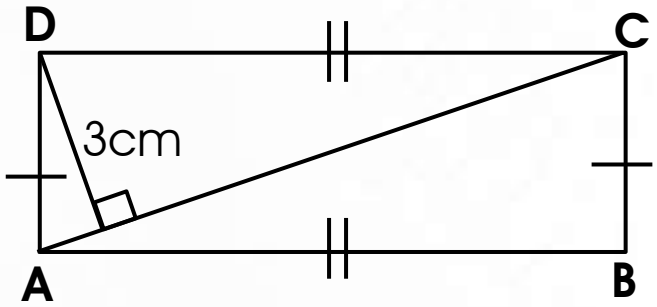
$m = 5 \div 3 \text{ (finite } 7)$

$m = (5 + 7) \div 3(\text{finite } 7)$

$m = 12 \div 3(\text{finite } 7)$

$m = 4(\text{finite } 7)$

Qn. 17 The area of the rectangle ABCD in the figure below is 81 cm^2.



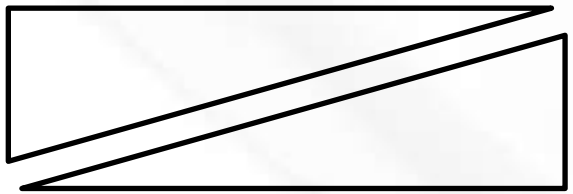
Find the length of diagonal AC.

Observation

- *A learner needs to apply the relationship between the area of the triangle and the area of the rectangle to solve the given problem.*

Suggestion

- *Guide learners to derive the formula of finding the area of the triangle.*
  * *A rectangle has 2 congruent right angled triangles.*



Rectangle = *2 times area of one triangle*

$= 2 \times \frac{1}{2} \times b \times h$

$= b \times h$

Solution

$2 \times \frac{1}{2} \times b \times h = A$

$2 \times \frac{1}{2} \times b \times 3\ cm = 81\ cm^2$

$\frac{b \times 3\ cm}{3\ cm} = \frac{81\ cm \times cm}{3\ cm}$

$b = 21\ cm$

Diagonal AC = 21 cm

Qn. 18 **In 5 matches, the mean number of goals scored by Buddu FC is 3. If they play the sixth match, the average number of goals becomes 4. How many goals were scored in the 6th match?**

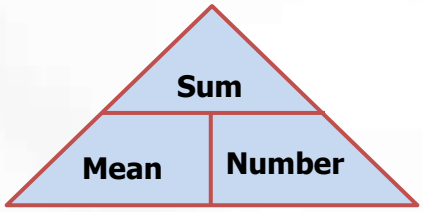
Observation

- A learner needs to use the formula of finding mean to solve the given problem.

Suggestion

- Guide learners to know the relationship between mean, mode, median and range.

** Mean is the average of the given numbers calculated by dividing the sum of the given numbers by the total number of the numbers.*



Mean = Sum ÷ Number

Number = Sum ÷ Mean

Sum = Mean × Number

** Median is the middle value in the data set.*

** Mode is the number that occurs the most in a given list of numbers.*

- Enough practice on word problems involving mean.

Solution

(Mean × Number) – (Mean × Number)

(4 × 6) – (3 × 5)

24 – 15

9 goals

Qn. 19 An elephant covered 1 metre in 3.6 seconds. Find the speed at which the elephant moved in Km/h.

Observation

- A learner needs to apply the formula of finding speed to the speed in m/s to km/h.

Suggestion

- Teach learners these concepts.

** Metres per second (m/s) and kilometres per hour (km/h) are units of speed.*

** Kilometres per hour (km/h) measures the distance covered in number of kilometres per one hour and metres per second measures the distance covered in metres per one second.*

** To convert metres to kilometres, the quantity is divided by 1000 and to convert seconds into hours, the quantity is divided by 3600.*

** So, to convert m/s to k/m, the numerator must be divided by 1000 and the denominator must be divided by 3600. This means that, the whole quantity that is given in m/s must be multiplied by* $\frac{3600}{1000}$.

Solution

$$\text{Speed} = \frac{\text{Distance}}{\text{Time}}$$

$$\text{Speed} = \frac{1 \div 1000}{3.6 \div 3600}$$

$$\text{Speed} = \frac{1}{3.6} \div \frac{1000}{3600}$$

$$\text{Speed} = \frac{1}{3.6} \times \frac{3600}{1000}$$

$$\text{Speed} = \frac{1 \times 3600}{36 \times 100}$$

$$\text{Speed} = 1\text{km/h}$$

Qn. 20 Find the loss made on a dozen of rubbers bought at sh 6250 and sold at sh 500 each.

Observation

- *A learner needs to know that loss is made when the buying price is greater than the selling price.*

Suggestion

- *Teach learners that:*
  - *When the cost price is higher than the selling price, the difference between is the loss suffered. (Formula : **Loss = Cost Price – Selling Price**)*
  - *When the selling price is higher than the cost price, the difference between is the profit gained. The profit can be calculated using a formula:* ***Profit = Selling Price – Cost Price***
- *Emphasize correct symbols used to represent shillings (**sh**)*
- *Revise all problems related to money including simple interest.*

Solution

Loss = Cost Price – Selling Price

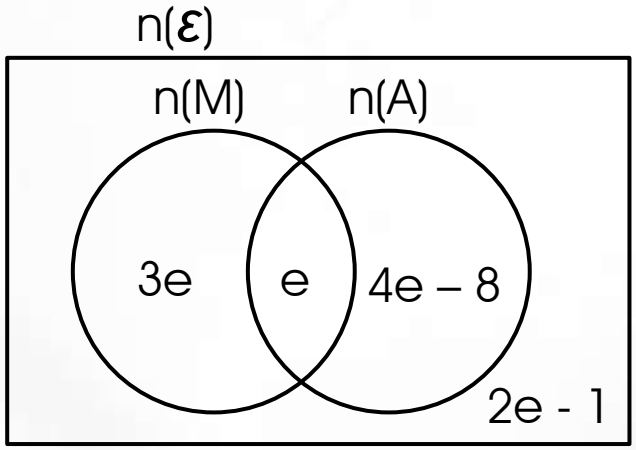
Loss = sh 6250 – (sh 500 × 12)

Loss = sh 6250 – sh 6000

Loss = sh 250

SECTION B: 60 MARKS

21. The Venn diagram below represents the number of pupils in a class who like music (M), art (A) and nether of the two subjects. The number of pupils who like music only is the same as the number of pupils who like art altogether.



(b) Find the;
  (i) value of e.
  (ii) the total number of pupils in the class.

(c) Find the probability that the pupil picked at random does not like Art.

Observation

- *The learner needs to know parts of a set.*

Suggestion

- *Help learners apply knowledge learnt in sets.*
- *Revise parts of a set.*

  * $n(A)'$ *represents the number of pupils who do not like art i.e.* $n(M)only + n(M \cup A)'$

Solution

(a) (i)

$$3e = e + 4e - 8$$
$$3e = 5e - 8$$
$$3e - 5e = 5e - 5e - 8$$
$$-2e = -8$$
$$\frac{-2e}{2} = \frac{-8}{2}$$
$$e = 4$$

(ii)

$$(3e \times 2) + (2e - 1)$$
$$6e + 2e - 1$$
$$8e - 1$$
$$(8 \times 4) - 1$$
$$32 - 1$$
$$31 \text{ pupils}$$

(b) No. of pupils who do not like art

$$3e + 2e - 1$$
$$5e - 1$$
$$(5 \times 4) - 1$$
$$20 - 1$$
$$19 \text{ pupils}$$

D.C = 19

T.C = 31

$$\text{Probability} = \frac{\text{D.C}}{\text{T.C}}$$

$$\text{Probability} = \frac{19}{31}$$

22. (a) Work out: $1100_{two} - 111_{two}$

$$\begin{array}{r} {\scriptstyle 2\ \ 1} \\ {\scriptstyle \not2\ \not2\ \ 2} \\ \not1\ \not1\ \not0\ 0_{two} \\ 1\ 1\ 1_{two} \\ \hline 1\ 0\ 1_{two} \end{array}$$

(b) Change 34_{five} to base two.

34_{five} to base ten

f	o
3	4

$(3 \times 5) + (4 \times 1)$

$15 + 4$

19_{two}

19_{ten} to base two

Base	No.	Rem
2	19	1
2	9	1
2	4	0
2	2	0
2	1	1
	0	

$34_{five} = 10011_{two}$

23. The sum of three consecutive odd multiples of 3 is 117. Find these multiples.

Let the least multiple be y

1st	2nd	3rd	Sum
y	y+6	y+12	117

Value of y

$y + y + 6 + y + 12 = 117$

$y + y + y + 6 + 12 = 117$

$3y + 18 = 117$

$3y + 18 - 18 = 117 - 18$

$3y = 99$

$\frac{3y}{3} = \frac{99}{3}$

$y = 33$

1st multiple

$y = 33$

2nd multiple

$y + 6$

$33 + 6$

39

3rd multiple

$y + 12$

$33 + 12$

45

The multiple are 33, 39 and 45

24. The table below shows how different currencies are sold at Mkopex forex bureau. Use it to answer questions that follow.

Currency	Selling rate
1 US dollar (US)	Ug.sh. 3800
1 Kenya shilling (K.sh.)	Ug.sh. 38

(a) Fred has Ug.sh. 190,000. How many US dollars will he get from Mkopex forex bureau.

$(\frac{190000}{3800})$ dollars

50 dollars

(b) A man exchanged 70 US dollars for K.Sh. 7600.
Find in Uganda shillings, the buying rate of Kenya shillings at the forex bureau.

70 × Ug.sh. 266000

Buying rate

Ug.sh. $(\frac{266000}{7600})$

Ug.sh. 35

K.sh.1 = Ug.sh. 35

25. A motorcyclist left his home at 7:30a.m travelling at an average speed of 60km/h for 3 hours to town. He stayed in the town for some time then drove back home through the same route. He reached home at 3:00 p.m.

(a) Find the total distance the motorcyclist covered.

$$D = S \times T$$

$$D = \frac{60\text{ km}}{1\text{ h}} \times 3\text{ h}$$

$$D = 60\text{ km} \times 3$$

$$D = 180\text{ km}$$

Total distance

180 km

+ 180 km

360 km

(b) Calculate his average speed for the whole journey.

12 : 00

- 7 : 30

4 : 30

+3 : 00

7 : 30

7 hours 30 minutes

$7\frac{1}{2}$ hours

$$\text{Average speed} = \frac{\text{Total distance covered}}{\text{Total time taken}}$$

$$= 360\text{ km} \div 7\frac{1}{2}\text{ h}$$

$$= 360\text{ km} \div \frac{15}{2}\text{ h}$$

$$= 360\text{ km} \times \frac{2}{15}\text{ h}$$

$$= 24\text{km/h}$$

26. (a) Work out: $\dfrac{2.7 - 0.9}{0.36}$

$$\begin{array}{r} 2.7 \\ -\ 0.9 \\ \hline 1.8 \end{array}$$

$$\frac{1.8}{0.36} = \frac{18}{10} \div \frac{36}{100}$$

$$= \frac{18}{10} \times \frac{100}{36}$$

$$= 5$$

(b) A pen was three quarters full of ink, $\frac{4}{9}$ of the ink in the pen was used. Find the fraction of the remaining ink in the pen.

$$\frac{3}{4} - \left(\frac{4}{9} \times \frac{3}{4}\right)$$

$$\frac{3}{4} - \left(\frac{1 \times 1}{3 \times 1}\right)$$

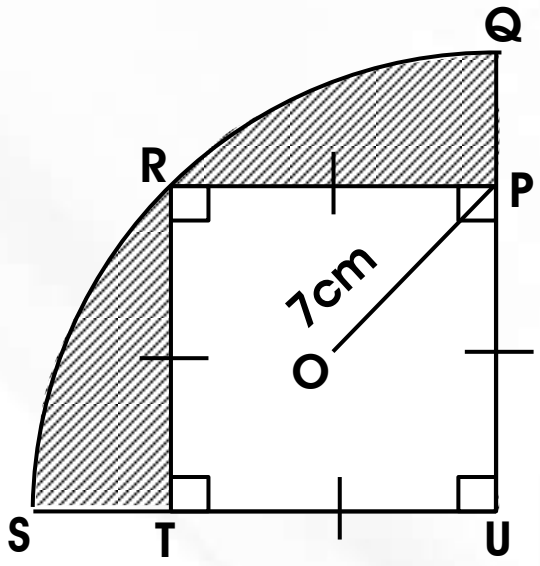
$$\frac{3}{4} - \frac{1}{3}$$

$$\frac{3}{4} = \frac{6}{8}, \frac{9}{12} \ldots$$

$$\frac{1}{3} = \frac{2}{6}, \frac{3}{9}, \frac{4}{12} \ldots$$

$$\frac{9}{12} - \frac{4}{12} = \frac{5}{12}$$

27. In the figure below, square UPRT is enclosed in a quadrant UQS. Point O is the centre of the square. Study the figure carefully and use it to answer questions that follow.



(a) Find the area of the square UPRT if OP = 7cm

Length of each diagonal

7 cm + 7 cm = 14 cm

Area

$A = \frac{1}{2} \times d_1 \times d_2$

$A = \frac{1}{2} \times 14\text{ cm} \times 14\text{ cm}$

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

(b) Calculate the area of the shaded part. (Use π as $\frac{22}{7}$)

Area of the quadrant

$A = \frac{1}{4} \times \pi r^2$

$A = \frac{1}{4} \times \frac{22}{7} \times 14\text{ cm} \times 14\text{ cm}$

$A = 154\text{ cm}^2$

Area of the shaded part

154 cm^2

$-\ 98\text{ cm}^2$

56 cm^2

28. A farmer borrowed money from at an interest rate of $12\frac{1}{2}\%$ per annum. She used all the money to buy 16 goats. After a period of 9 months, she paid an interest of sh 450000. Calculate the amount of money the farmer.

Amount of money she borrowed

$$P \times R \times T = \text{sh } 450000$$

$$p \times 12\frac{1}{2}\% \times \frac{9}{12} = \text{sh } 450000$$

$$p \times \frac{25}{2} \times \frac{1}{100} \times \frac{9}{12} = \text{sh } 450000$$

$$\frac{3p}{36} = \text{sh } 450000$$

$$36 \times \frac{3p}{36} = \text{sh } 450000 \times 36$$

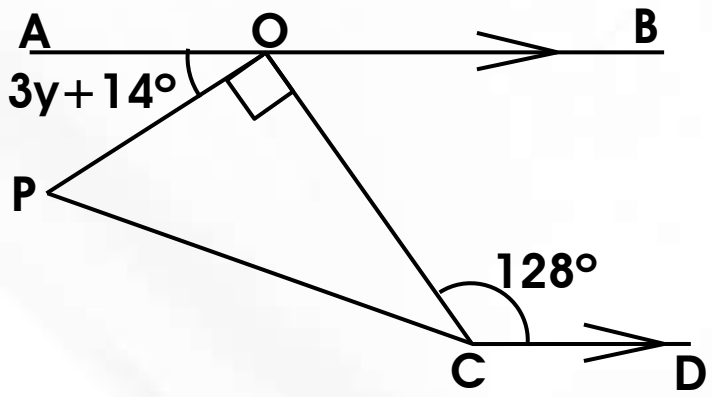
$$\frac{3p}{3} = \frac{\text{sh } 450000 \times 36}{3}$$

$$p = \text{sh } 4800000$$

Amount of money she paid for each goat

sh 4800000 ÷ 16 = sh 300000

29. In the figure below, AB is parallel to CD, angle OCD = 128° and angle OCP is 2° more than angle AOP. Study the diagram below and use it to answer questions that follow.



(a) Find the value of y

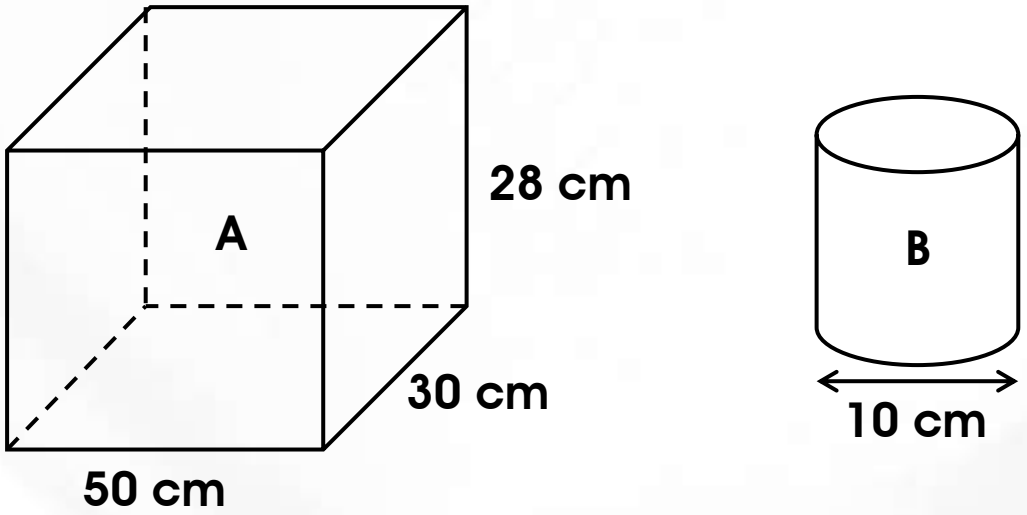
$$3y + 14° + 90° = 128°$$
$$3y + 104° = 128°$$
$$3y + 104° - 104° = 128° - 104°$$
$$3y = 24°$$
$$\frac{3y}{3} = \frac{24°}{3}$$
$$y = 8°$$

(b) Find the size of angle OPC in degrees.

Angle OCP $= 3y + 14° + 2°$
$= (3 \times 8°) + 16°$
$= 24° + 16°$
$= 40°$

Angle OPC $= 180° - (90° + 40°)$
$= 180° - 130°$
$= 50°$

30. In a factory, thirty tins of size B were packed in a box size A leaving a space of 9000 cm^3.



(a) Calculate the volume of the box.

Volume = Base area x height
= l × w × h
= 50 cm × 30 cm × 28 cm
= 42000 cm^3

(b) Find the volume occupied by the tins packed on the first layer of the box.

Volume of 30 tins

$42000\ cm^3 - 9000\ cm^3 = 33000\ cm^3$

Volume of each tin

$33000\ cm^3 \div 30 = 1100\ cm^3$

Tins packed on the first layer of the box

$\frac{50}{10} = 5$ tins

$\frac{50}{10} = 3$ tins

$5 \times 3 = 15$ tins

Volume of tins packed on the first layer of the box

$15 \times 1100\ cm^3 = 16500\ cm^3$

31. In a shop, the cost of a rubber is half of the cost of a book and a geometry set costs 5 times as much as a rubber. Kizza paid sh 4000 for the three items. Find the cost of a geometry set.

Let the cost of a book be b

Book	Rubber	Geometry set
b	$\frac{1}{2}$b	$\frac{5}{2}$b

Value of b

$$b + \frac{1}{2}b + \frac{5}{2}b = \text{sh } 4000$$

$$(2\times b) + (2\times\frac{1}{2}b) + (2\times\frac{5}{2}b) = 2\times \text{sh } 4000$$

$$2b + b + 5b = \text{sh } 8000$$

$$8b = \text{sh } 8000$$

$$\frac{8b}{8} = \frac{\text{sh } 8000}{8}$$

$$b = \text{sh } 1000$$

Cost of a geometry set

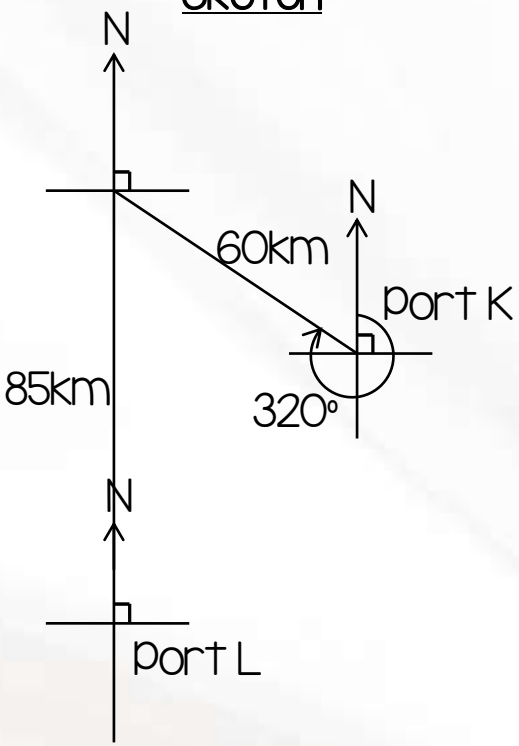
$$\frac{5}{2}b = \frac{5}{2} \times \text{sh } 1000$$

$$= \text{sh } 2500$$

32. A ship sailed 60 kilometres from port K on a bearing of 320°. It then changed its course and sailed 85 kilometres due south to port L.

(a) Using a scale 1 centimetre to represent 10 kilometres, draw an accurate diagram to show the route taken by the ship.

Sketch

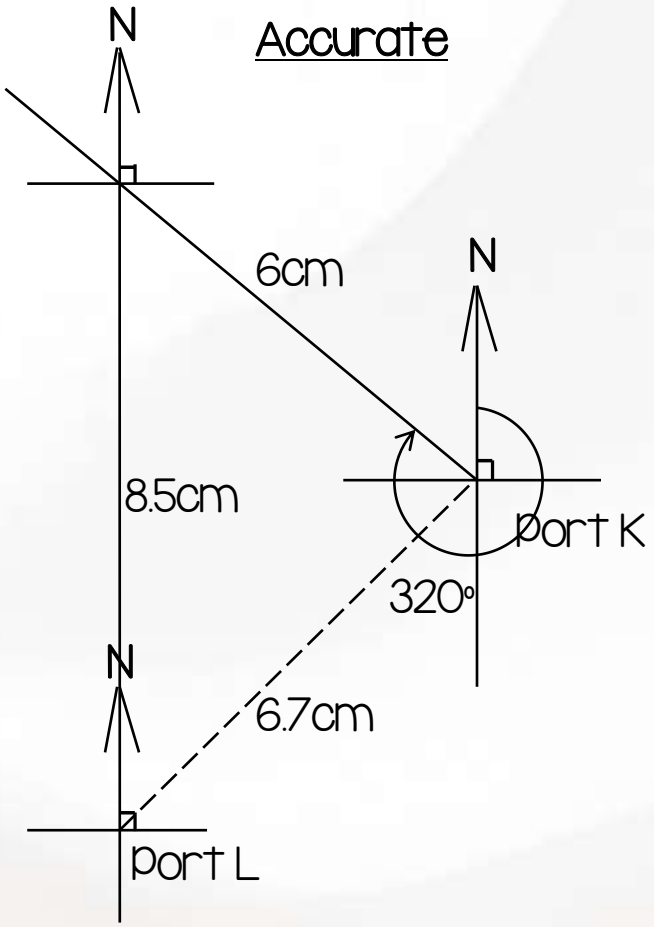


Drawing distance

$\frac{60}{10} = 6$ cm

$\frac{85}{10} = 8.5$ cm

Accurate



(b) Find the shortest distance between the two ports.

$6.7 \times 10\text{km} = 67\text{km}$