SECTION A (02 marks each)

1. Work out:

$$\begin{array}{r} 346 \\ +148 \\ \hline 494 \end{array}$$

$6+8=14$, $4+4+1=9$, $3+1=4$ → 494

2. Write 96 in Roman numerals.

$96 = 90 + 6$

$90 \rightarrow XC$, $6 \rightarrow VI$

$96 = XCVI$ ✓m ✓m

3. Convert 17_{ten} to binary base.

B	N	R
2	17	rem.1
2	8	rem.0
2	4	rem.0
2	2	rem.0
	1	

$17_{tem} = 10001_{two}$ ✓m ✓m

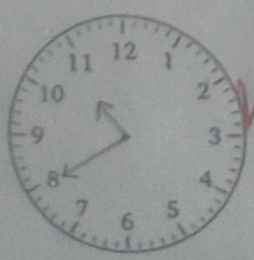
4. Write 637 in standard form

$637 \div 10 = 63{\cdot}7$ ✓m

$63{\cdot}7 \div 10 = 6{\cdot}37$

$= 6{\cdot}37 \times 10^2$ ✓m

5. On the clock face below, show 20 minutes to 11 O'clock.



✓02

$60 - 20 = 40\,min$

81
27
9
3
1

6. Solve: $3^{2a} \div 81 = 1$

$3^{2a} \div 81 = 1$

$3^{2a} \div 3^4 = 1$

$3^{2a-4} = 3^0$ ✓m

$2a - 4 = 0$

$2a - 4 + 4 = 0 + 4$

$2a = 4$

$\frac{2a}{2} = \frac{4^2}{2}$

$a = 2$ ✓m

7. Given that set K={a, b, c}, how many subsets has set K?

$n(K) = 3$

№ of subsets $= 2^n$

$= 2^3$ ✓m

$= 2 \times 2 \times 2$

$= 8$ subsets ✓m

8. List down the prime factors of 144.

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

✓m

PF 144 = {2, 2, 2, 2, 3, 3} ✓

9. Given that $p = \frac{1}{2}$, $q = \frac{2}{3}$ and $r = \frac{1}{4}$, find the value of $p + qr$.

$p + qr$

$p + (q \times r)$

$\frac{1}{2} + \left(\frac{2}{3} \times \frac{1}{4}\right)$

$\frac{1}{2} + \frac{1}{6}$, LCD = 6 ✓m

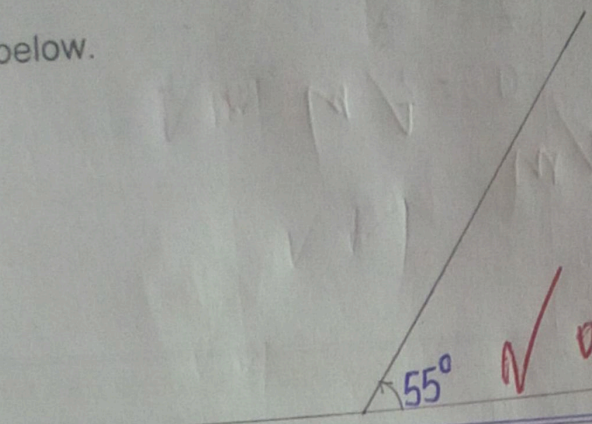
$\frac{\left(\frac{1}{2} \times 6\right) + \left(\frac{1}{6} \times 6\right)}{6}$

$\frac{3+1}{6}$

$\frac{4^2}{6_3}$

$\frac{2}{3}$ ✓m

10. Using a ruler, a pencil and a protractor, draw an angle of 55^0 in the space provided below.



11. Simplify: $\frac{3}{4} + 1\frac{1}{2}$

$\frac{3}{4} + \frac{3}{2}$, LCD = 4

$\left(\frac{3}{4} \times \frac{1}{1}\right) + \left(\frac{3}{2} \times \frac{2}{2}\right)$

$\frac{3+6}{4}$

$\frac{9}{4}$

$2\frac{1}{4}$

12. If today is Wednesday, what day of the week it be 40 days from now?

Wednesday + 40days = - (finite 7)

3 + 40 = - (finite 7)

43 ÷ 7 = 6rem. 1 (finite 7)

= 1 (finite 7)

It will be Monday

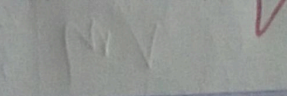
13. If  represents 12 trees, draw such pictures to represent 60 trees

12 trees ⟶ 1 picture

1 tree ⟶ $\frac{1}{12}$ picture

60 trees ⟶ $\left(\frac{1}{12} \times \frac{5}{60}\right)$ pictures

= 5 pictures



14. The base area of a cylindrical tin is $308cm^3$. Calculate its volume if its height is 15cm.

Volume = base area x Height ✓m
= $308cm^2$ x 15cm
= $4620cm^3$ ✓m

308 x 15 = 1540 + 3080 = 4620

15. A trader sold an article at sh.7900 making a profit of sh.700. Calculate the cost price of the article.

S.P = sh 7,900
P = sh 700
C.P = S.P - P ✓m
= sh 7900
- sh 700
sh 7,200 ✓m

16. Find the least number of books given to 12 or 15 pupils and 3 books remain.

LCM = 2 | 12 | 15
2 | 6 | 15
3 | 3 | 15
5 | 1 | 5
| 1 | 1

No = LCM + Rem. ✓m
= (2x2x3x5) + 3
= 60 + 3
= 63 books ✓m

17. Increase 8400 kg by $12\frac{1}{3}\%$

New no = New %tage x Original no
= $(12\frac{1}{3}\% + 100\%) \times 8400kg$
= $(12\% + 100\% + \frac{1}{3}\%) \times 8400kg$
= $112\frac{1}{3}\% \times 8400kg$ ✓m
= $\frac{337}{3}\% \times 8400kg$

$= (\frac{337}{3} \div 100) \times 8400kg$
$= \frac{337}{3} \times \frac{1}{100} \times 8400kg$
$= (337 \times 28)kg$
$= 9436kg$ ✓m

337 x 28 = 2696 + 6740 = 9436

18. Calculate the circumference of a circular garden whose diameter is 28cm.

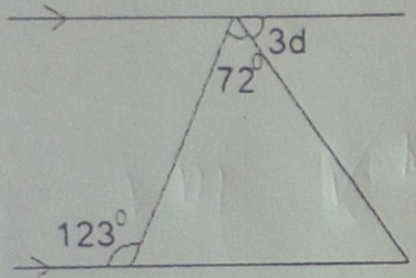
$C = \pi d$

$= \pi \times d$

$= \frac{22}{7_1} \times \frac{4}{28}\text{cm}$

$= 88\text{cm}$

19. Find the value of d in the figure below;



$3d + 72^\circ = 123^\circ$

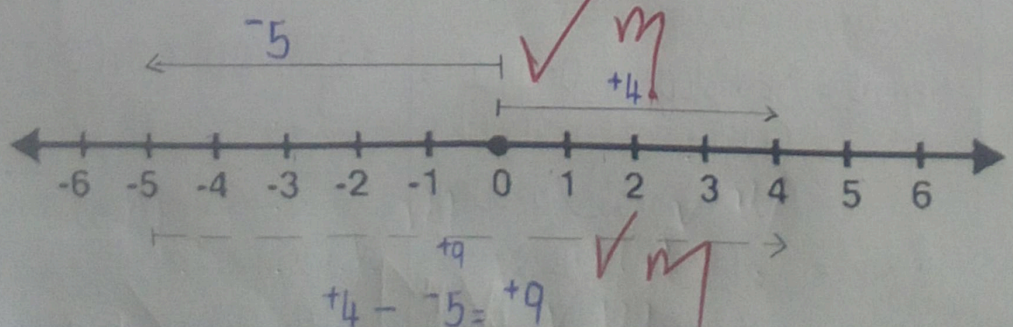
$3d + 72^\circ - 72^\circ = 123^\circ - 72^\circ$

$3d = 51^\circ$

$\frac{3d}{3_1} = \frac{51^\circ}{31}$

$d = 17^\circ$

20. Work out $(^+4) - (^-5)$ using a number line below



$+4 - {}^-5 = {}^+9$

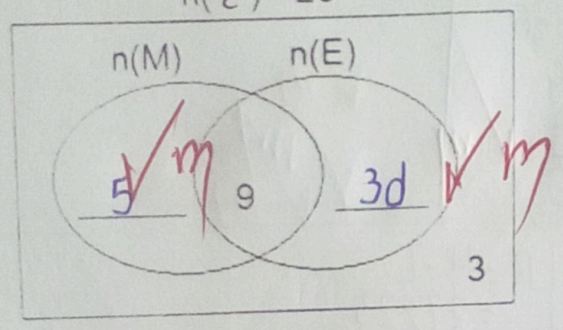
SECTION B: (60 *Marks*)

21. In a school of 26 teachers, 14 teach Maths(M), 3d teach English (E) only, 9 teach both subjects while 3 teach other subjects.

a) Complete the Venn diagram using the above information. (02 *marks*)

$n(\varepsilon) = 26$

$14 - 9 = 5$



b) How many teachers teach in English? (02 *marks*)

Value of d

$5 + 9 + 3d + 3 = 26$

$5 + 9 + 3 + 3d = 26$

$17 + 3d = 26$

$17 - 17 + 3d = 26 - 17$

$3d = 9$

$\frac{3d}{3} = \frac{9}{3}$

$d = 3$

№ of teachers in English $= 9 + 3d$

$= 9 + (3 \times 3)$

$= 9 + 9$

$= 18$ teachers

c) Find the probability of choosing at random a teacher who teaches one subject (01 *mark*)

$n(E) = 5 + 3d$

$= 5 + (3 \times 3)$

$= 5 + 9$

$= 14$

$n(S) = 26$

$Pro. = \frac{n(E)}{n(S)}$

$= \frac{14}{26}$

22. The sum of three consecutive odd numbers is 75. If the first number is K,

(03 *marks*)

a) Find the value of K.

1st	2nd	3rd	Sum
k	k+2	k+4	75

$k + k + 2 + k + 4 = 75$ ✓m

$k + k + k + 2 + 4 = 75$

$3k + 6 = 75$

$3k + 6 - 6 = 75 - 6$

$3k = 69$ ✓m

$\frac{3k}{3} = \frac{69}{3}$

$k = 23$

$k = 23$ ✓m

b) Work out their range. (02 *marks*)

$H = k + 4$

$= 23 + 4$

$= 27$ ✓m

$L = k$

$= 23$

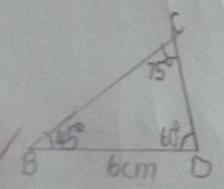
$R = H - L$

$= 27 - 23$

$= 4$ ✓m

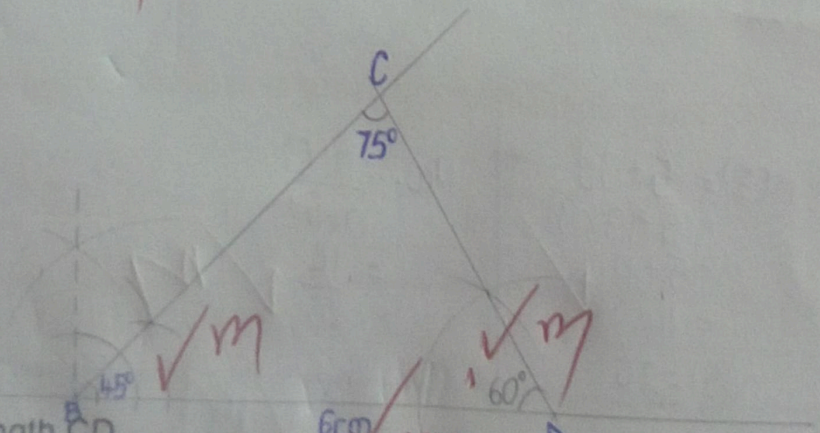
23. a) Using a ruler and a pair of compasses, construct a triangle BCD where BD = 6cm, angle BCD = 75° and angle DBC = 45°. (04 *marks*)

Sketch



✓4m

accurate

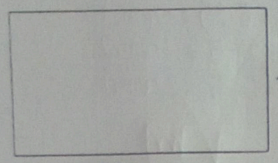


✓m ✓m ✓m

b) Measure length CD (01 *mark*)

$\overline{CD} = 4.4\text{cm}$ ✓m

26. A piece of metal below was folded to form a cylindrical container.



a) Calculate the area of the piece of metal above. (02 *marks*)

Area = L x W
= 220cm x 100cm
= 22,000cm²

b) Work out the volume of the cylindrical container formed. (take $\pi = \frac{22}{7}$)

(03 *marks*)

$\pi d = C$
$\frac{22}{7}d = 220cm$
$\frac{22}{7}d \times 7 = (220 \times 7)cm$
$22d = (220 \times 7)cm$
$\frac{22d}{22} = \frac{(220 \times 7)}{22}cm$
$d = 70cm$

Volume = $\pi r^2 \times H$
$= (\frac{22}{7} \times 35cm \times 35cm \times 100cm)$
$= (22 \times 35cm \times 500cm^2)$
$= 385000cm^3$

27. a) Simplify: $\frac{6m^8 \times 4m^3}{8m^4}$ (02 *marks*)

$\frac{6m^8 \times 4m^3}{8m^4}$

$\left(\frac{3 \times 2 \times m \times m \times m \times m \times m \times m \times m \times m \times m \times m}{2 \times 2 \times 2 \times m \times m \times m \times m}\right)$

$3m^7$

10

(02 marks)

24. a) Work out:

$$\begin{array}{r} {}^{1}\quad {}^{1} \\ 4\ 3\ 2_{five} \\ +\ 1\ 3\ 4_{five} \\ \hline 1\ 1\ 2\ 1_{five} \end{array}$$

$4+2=6\div5=1$ rem. 1
$1+3+3=7\div5=1$ rem. 2
$1+4+1=6\div5=1$ rem. 1

(03 marks)

b) Given that $46_p = 202_{five}$, find the value of p.

$$\begin{array}{|c|c|} \hline 4 & 6 \\ \hline p^1 & p^0 \\ \hline \end{array} = \begin{array}{|c|c|c|} \hline 2 & 0 & 2 \\ \hline 5^2 & 5^1 & 5^0 \\ \hline \end{array}$$

$(4\times p^1)+(p^0\times 6)=(2\times5^2)+(0\times5^1)+(2\times5^0)$

$(4\times p)+(1\times6)=(2\times5\times5)+(0\times5)+(2\times1)$

$4p+6=50+0+2$

$4p+6=52$

$4p+6-6=52-6$

$4p=46$

$\frac{4p}{4}=\frac{46}{4}$

$p=11\frac{2}{4}$

$p=11\frac{1}{2}$

25. a) Express 0.233....to a common fraction in its lowest terms. (02 marks)

let fraction be d

$d=0.233\ldots$

$d\times100=100\times0.233\ldots$

$100d=23.333\ldots$

$100d=23.333\ldots$
$-\ d=0.233\ldots$

$99d=23.1$

$99d=23.1$

$\frac{99d}{99}=\frac{231}{10}\div99$

$d=\frac{231}{10}\times\frac{1}{99}$

$d=\frac{7}{30}$

b) Simplify: $\dfrac{16.2-9.95}{1.25\times0.05}$ (03 marks)

$$\begin{array}{r} {}^{1}{}^{5}\ {}^{1}{}^{1}\ {}^{1}{}^{0} \\ 16.20 \\ -\ 9.95 \\ \hline 6.25 \end{array}$$

$\frac{6.25}{1.25\times0.05}$

$\left(\frac{625}{100}\right)\div\left(\frac{125}{100}\times\frac{5}{100}\right)$

$\frac{625}{100}\times\frac{100}{125}\times\frac{100}{5}$

$\frac{100}{1}$

100

b) Solve: $\frac{3p+1}{4} = \frac{p+2}{3}$ (03 *marks*)

$3p+1 = p+2$ (4 × 3)

$3(3p+1) = 4(p+2)$ ✓m

$9p+3 = 4p+8$ ✓m

$9p-4p+3 = 4p-4p+8$

$5p+3 = 8$

$5p+3-3 = 8-3$ ✓m

$5p = 5$

$\frac{5p}{5} = \frac{5}{5}$

$p = 1$ ✓b

28. Rose went to market and bought the items as shown in the table below;

a) Complete the table below. (04 *marks*)

Item	Quantity	Unit cost	Amount
Wheat flour	2 packets	Sh.7,000 each ✓	Sh..14,000..... ✓m
Cooking oil	$1\frac{1}{2}$ litres	Sh....9000.... ✓m litre	Sh.13,500
Rice	.....3..... ✓m kg	Sh.3,600	Sh..10,800..... ✓m
		TOTAL	Sh.38,300

Wheat flour
$A = U.C \times Q$
$= sh\ 7000 \times 2$
$= sh\ 14,000$ ✓

Oil
$U.C = \frac{A}{Q}$
$= sh\ 13500 \div \frac{3}{2}$
$= sh\ 13500 \times \frac{2}{3}$
$= sh\ 9000$ ✓

Rice
$A = sh(38,300 - (14000 + 13500))$
$= sh\ 38\,300$
$- sh\ 27\,500$
$sh\ 10,800$ ✓

$Q = \frac{A}{U.C}$
$= \frac{sh\ 10800}{sh\ 3600}$
$= 3kg$ ✓

b) If she was given a change of sh.11,700 , how much money did she have before shopping? (01 *mark*)

Money she had before shopping
$= sh\ 38\,300$
$+ sh\ 11\,700$
$sh\ 50,000$ ✓m

29. The interior angle sum of a regular polygon is 1440^0.

a) Calculate the number of sides of the polygon. (03 *marks*)

$180^\circ(n-2) = \text{Int.}\angle\text{sum}$

$180^\circ n - 360^\circ = 1440^\circ$

$180^\circ n - 360^\circ + 360^\circ = 1440^\circ + 360^\circ$ ✓m

$180^\circ n = 1800^\circ$

$\frac{180^\circ n}{180^\circ} = \frac{1800^\circ}{180^\circ}$ ✓m

$n = 10$

No of sides $= 10$ ✓m

b) Work out the size of its exterior angle. (02 *marks*)

$\text{Size of each ext.}\angle = \frac{\text{Sum of ext.}\angle\text{'s}}{\text{No of sides}}$ ✓m

$= \frac{360^\circ}{10}$

$= 36^\circ$ ✓m

30. Tom had of a $\frac{3}{4}$ sugarcane and gave $\frac{1}{9}$ of it to Bashirah.

a) What fraction did he remain with? (03 *marks*)

Had $= \frac{3}{4}$

Gave out $= \frac{1}{9} \times \frac{3}{4}$

$= \frac{1}{12}$ ✓m

Rem $= \frac{3}{4} - \frac{1}{12}$, LCD $= 12$

$= \frac{(3 \times 3) - (1 \times 1)}{12}$ ✓m

$= \frac{9-1}{12}$

$= \frac{8}{12}$

$= \frac{2}{3}$ ✓m

b) If the part he remained with was 400cm long, find the total length of the sugarcane. (02 *marks*)

let the total length of the sugarcane be d

$\frac{2}{3} \times d = 400cm$ ✓m

$\frac{2d}{3} = 400cm$

$\frac{2d}{3_1} \times \frac{1}{3} = (400 \times 3)cm$

$2d = 1200cm$

$\frac{1}{2_1}d = \frac{1200^{600}cm}{2_1}$

$d = 600\,cm$ ✓m

31. a) Express 25m/sec to km/h. (02 *marks*)

m → km

1000m → 1km

1m → $\frac{1}{1000}$ km

25m → $\left(\frac{1}{1000_{40}} \times 25\right)$

$= \frac{1}{40}$ km

sec → hr

3600sec → 1hour

1sec → $\frac{1}{3600}$ hr

m/sec → km/hr

$\frac{1\,km}{40} \div \frac{1\,hr}{3600}$ ✓m

$\frac{1km}{1_{40}} \times \frac{3600^{90}}{1hr}$

90km/hr ✓m

b) A motorist covered a journey at a speed of 54km/h in $4\frac{1}{2}$ hours. How long will the motorist take to cover the same distance at a speed of 81km/h? (03 *marks*)

D = S x T

$= \frac{54^{27}km}{1hr} \times \frac{9hr}{2_1}$ ✓m

= 243km

S = 81km/hr

D = 243km

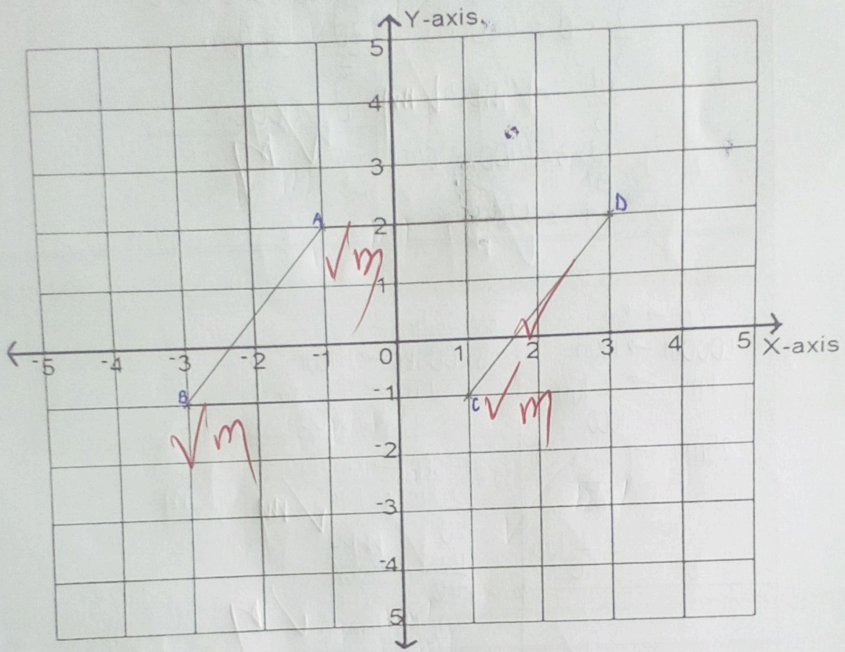
$T = \frac{D}{S}$ ✓m

$= \frac{243km}{81_1km}\,1hr$

= 3hours ✓m

32. a) On the coordinate graph below, plot the following points: (03 *marks*)

A(-1,2) , B(-3, -1) and C(1, -1)



b) Plot point D and join A to B, B to C, C to D and D to A such that the figure formed is a parallelogram. (01 *mark*)

c) State the coordinates of point D. (01 *mark*)

D(3,2)

END