# DEPARTMENT OF MATHEMATICS

S.4 MATHEMATICS−2020

**PAPER 2 TEST 3**

2 HOURS : 30 MINUTES

- *Answer **all** the **ten** questions in section **A** and any **five** from section **B**.*
- *Any additional question(s) answered will **not** be marked.*

## SECTION A: (40 MARKS)

1.It is given that $10^{x}=3$ and $10^{y}=7$. What is the value of $10^{x+y}$? (*04marks*)

2.If $f(x)=ax+b$ and $f^{2}(x)=4x+15$, find $a$ and $b$. (*04marks*)

3. The volume $V$ cm$^3$ of a solid varies jointly as the square of the radius $r$ cm of its base and its height $h$ cm. Given that $V=180$cm$^3$, when $r=3$cm and $h$ = 10 cm;

(a) Determine the value of constant of proportionality.

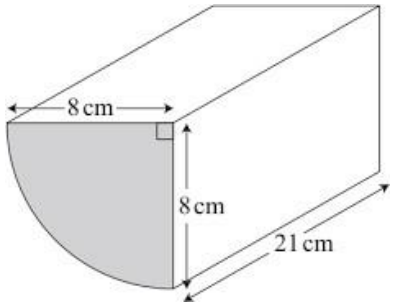
(b) Find the diameter of the base when $V$ = 480 cm$^3$ and $h$ = 15cm. (*04 marks*)

4.Find equation of a line passing through the point $(-2, 3)$ and parallel to the line $2y + 4x = 5$. (*04marks*)

5.A(2,3), B$(-1,5)$, C$(-1,1)$ and D$(k,1)$ are four points in the Cartesian plane. If $\overrightarrow{AC}$ is parallel to $\overrightarrow{BD}$, find $k$. (*04marks*)

6. By changing 0.425 into a fraction, express $m^{0.425}$ in the form $\sqrt[a]{m^{b}}$ where $a$ and $b$ are whole numbers with no common factors. (*04marks*)

7. Find the volume of the figurebelow.




(*04 marks*)

8. A radio costs shs 120,000 when bought for cash. Ben makes 20 monthly payments of shs 8,000 on hire purchase.Calculate

   (a) the total hire purchasecost

   (b) the extra amount of money Ben paid by using hirepurchase.( *04marks*)

9. Fatuma invested shs 450,000 in a saving scheme which offers a compound interes rate of 2% per anum. Calculate the amount she will get afterfive years. (*04marks*)

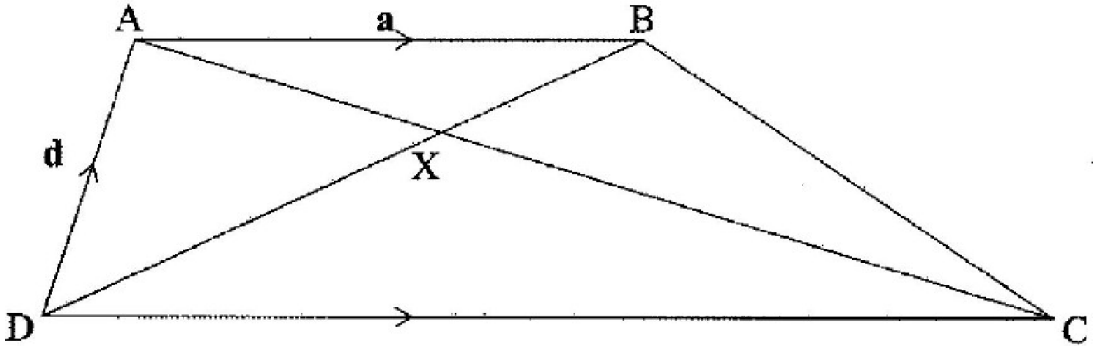
10. In a class, 20 pupils like science, 13 like history and 8 like both subjects. Nine pupils donot like euther subject. Use a Venn diagram to find how many pupils there are intheclass. (*04marks*)

## SECTION B: (60 MARKS)

11.(a)Giventhat $f(x)=x^2-3x+6$ andthat $g(x)=x+6$, solvetheequation $f(2x) = g(x) - 3$.

(b)If $g : x \longrightarrow \frac{a}{x-2}(x$ 2), find the values of $a$ if $g^2(-1) + 2g^{-1}(-1)=-3$. (*12marks*)

12. In the figure below ABCD, is a trapezium. AB is parallel to DC.Diagonals AC and DB intersect at X and DC=2AB. **AB** = **a**, **DA** = **d**, **AX** = $k$**AC** and **DX** = $h$**DB**, where $h$ and $k$ are constants.




(a) Findintermsof **a** and**d**:

(i) **BC**,

(ii) **AX**,

(iii) **DX**.

(b) Determine thevaluesof *h*and*K*. (*12marks*)

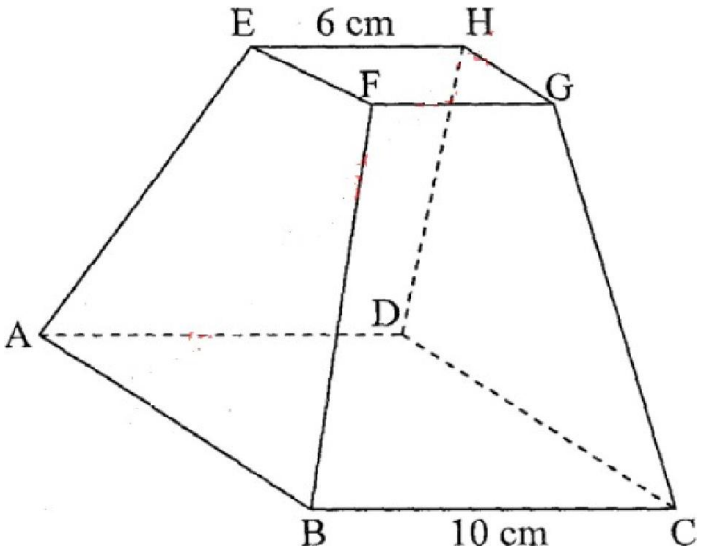
13.(a)Solve $\left(\frac{1}{3}\right)^{\Sigma_{x-5}} = 81^{x}$.

(b)Use logarithms to evaluate

(i) $\sqrt[4]{0.8635}$,

(ii) $\frac{19.43 \times 0.0365^{2}}{167.3}$. (*12marks*)

14. The figure below represent a solid frustum. The faces ABCD and EFGH are parallel squares of sides 10cm and 6 cm respectively. Each of the slanting edges AE, BF, CG and DH are equal to 4cm.



Determine the

(a) length of the projection of AE on the plane ABCD.

(b)angle between the line AE and the plane ABCD.

(c)angle between the plane BCGF andABCD.

(d)total surface area ofthefrustum. ( *12marks*)

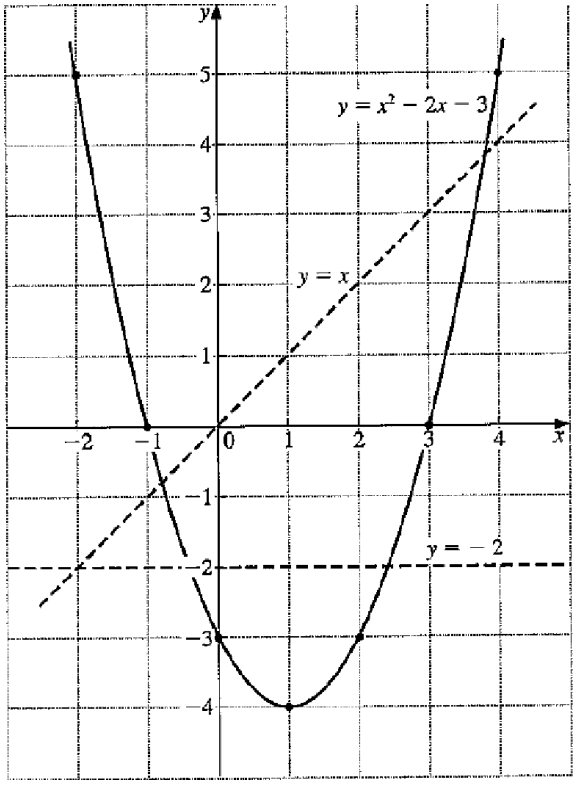
15. In a class of 40, 18 students can spell 'parallel' and 'rhombus'. 20 students can spell 'isosceles' and 'rhombus'. 19 can spell 'parallel' and 'isosceles'. 4 students can spell 'parallel' only. 3 students can spell 'rhombus' only.2 students can spell 'isosceles' only. 2 students can spell none of thesewords. How many students can spell (a)all

the three words.

(b) at most twowords.

(c) onlyoneword. ( *12marks*)

16. In the diagram, thegraphof $y = x^2 - 2x - 3$, $y = -2$ and $y = x$ havebeen drawn.



Use the graph to find the approximate solutions to thefollowing:

(a) $x^2-2x-3=0$ (b)
$x^2-2x-3=-2$

(c) $x^2-2x-3=x$

(d) $x^2-2x-1=0$. (*12marks*)

17. Use the advert below to answer the questions thatfollow.

| EASY TERM: T.V ON SALE! | |
|---|---|
| CASH VALUE: | Shs 1,200,000 |
| HIRE PURCHASE: | Deposit 10% of the csah value and pay either Shs. 40,000 weekly for 32 weeks or Shs 200,000 for 6 months. |

(a) Calculate the amount of money one would pay on weekly hire purchase.

(b)Calculate the amount of money one would pay on monthly hire purchase.

(c)Calculate the saving one would make by buying the T.V on cash terms rather than on monthly hire purchase.

(*12 marks*)

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