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.*
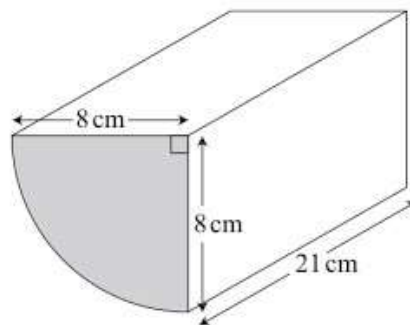- *Any additional question(s) answered will not be marked.*

SECTION A: (40 MARKS)

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

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

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 $h = 15$ cm.

   (*04 marks*)

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

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

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.   (*04 marks*)

7.   Find the volume of the figure below.

                                                                    (*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 purchase cost

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

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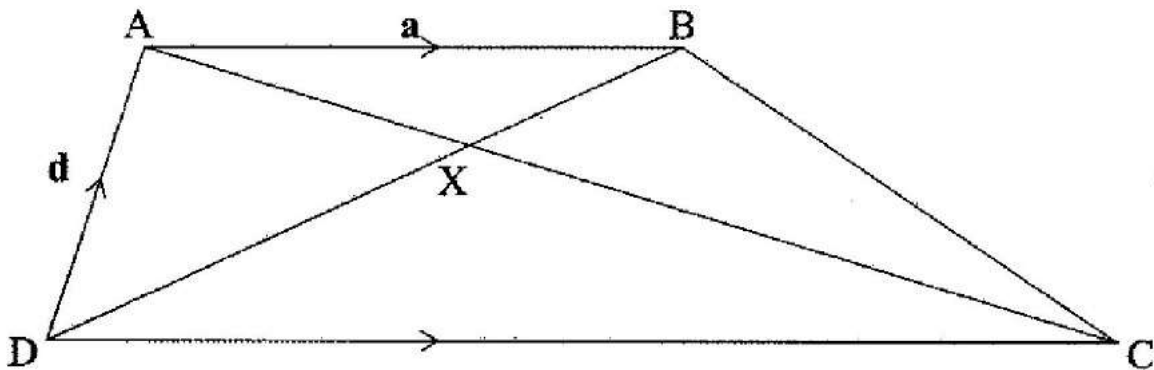
10.   In a class, 20 pupils like science, 13 like history and 8 like both subjects. Nine pupils donot like euther subject. Use a Venn diagram to find how many pupils there are in the class.   (*04 marks*)

SECTION B: (60 MARKS)

11.   (a) Given that $f(x) = x^2 - 3x + 6$ and that $g(x) = x + 6$, solve the equation $f(2x) = g(x) - 3$.

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

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)   Find interms of **a** and **d**:

      (i)   **BC**,

      (ii)   **AX**, (iii) **DX**.

(b)   Determine the values of h and K.   (*12 marks*)

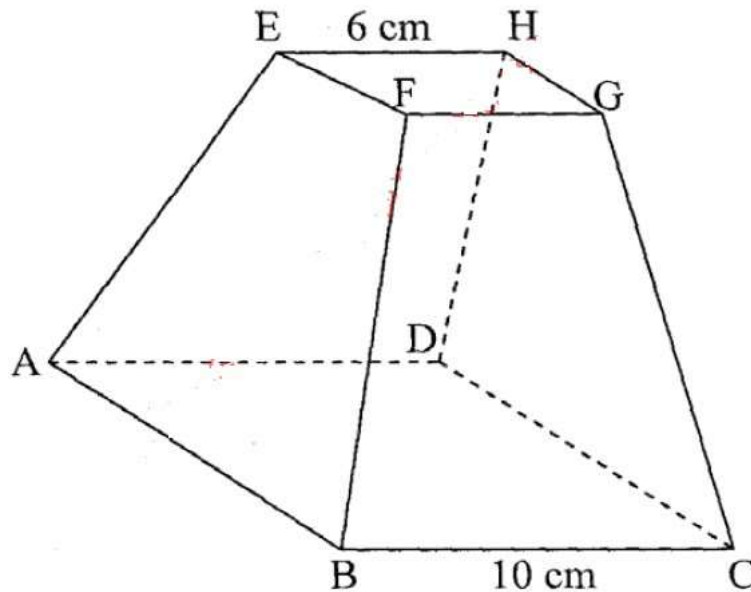13.   (a) Solve $\left(\dfrac{1}{3}\right)^{x-5} = 81^x$.

(b)   Use logarithms to evaluate

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

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

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 4 cm.
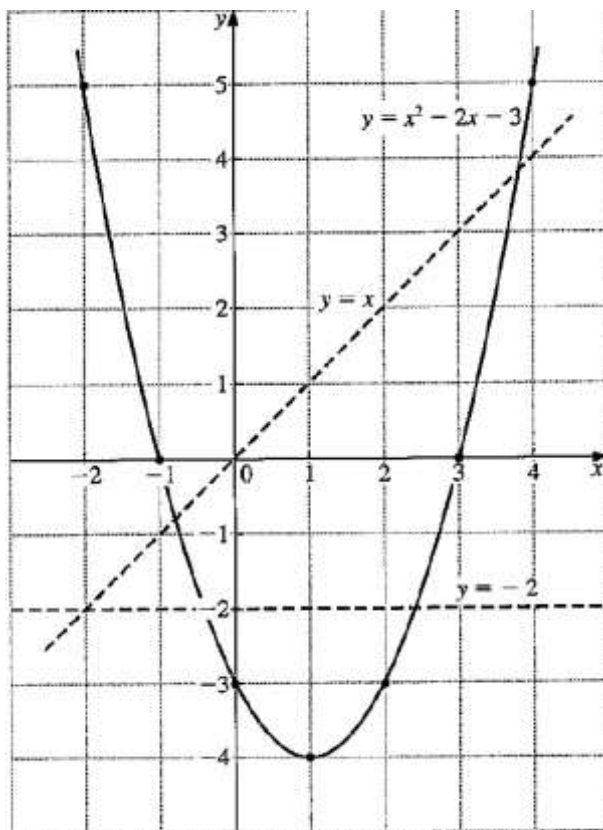

Determine the

(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 and ABCD.

(d) total surface area of the frustum. (*12 marks*)

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 these words. How many students can spell

(a) all the three words.

(b) at most two words.

(c)   only one word. (*12 marks*)

16.   In the diagram, the graph of $y = x^2 - 2x - 3$, $y = -2$ and $y = x$ have been drawn.

Use the graph to find the approximate solutions to the following:

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

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

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

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

17.   Use the advert below to answer the questions that follow.

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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.
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(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*)

−END−