

Name.....

Index No .....

Candidate's Signature .....

Date: .....

121/1

**MATHEMATICS**

Paper 1

July/August 2018

Time: 2½ Hours

# FOCUS A365 2018 PREDICTIONS

*Kenya Certificate of Secondary Education (K.C.S.E)*

**INSTRUCTIONS TO THE CANDIDATES**

- Write **your name** and **index number** in the spaces provided above
- **Sign** and write the **date** in the spaces provided.
- This paper contains **two** sections; **Section I** and **Section II**.
- Answer **all** the questions in **section I** and any **five** questions from **Section II**
- All workings and answers **must** be written on the question paper in the spaces provided below each question.
- Marks may be given for correct working **even if** the answer is wrong.
- Non programmable silent electronic calculators and KNEC Mathematical tables may be used **EXCEPT** where stated otherwise.
- Show all the steps in your calculations, giving your answers at each stage in the spaces below each question.

**FOR EXAMINER'S USE ONLY**

**Section I**

Question	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	Total
Marks																	

**Section II**

Question	17	18	19	20	21	22	23	24	<b>Total</b>
Marks									

**GRAND TOTAL**

*This paper consists of 15 printed pages. Candidates should check to ascertain that all pages are printed as indicated and that no questions are missing.*

**SECTION 1 (50 MARKS)**

**Answer all questions in this section**

1. Without using a calculator or mathematical tables, evaluate:

$$\frac{36 - 8 \times -4 - 15 \div -3}{3x - 3 + -8 (6 - (-2))}$$

$$3x - 3 + -8 (6 - (-2))$$

(3mks)

2. Use reciprocals, cubes and square root tables to evaluate

$$\frac{2}{0.9272} + \sqrt[3]{20.7726} - \sqrt{0.2643}$$

(4mks)

3. Simplify  $\frac{2y^2 - 3xy - 2x^2}{4y^2 - x^2}$

(3mks)

4. A UK tourist comes to Kenya with £30, 000. He pays 20% commission at the airport and his expenses in Kenya amounted to Kshs. 90,000. How much money did he remain with in Ksh?  
(Take 1 UK £ = Kshs 70.50) (3mks)

5. Solve for  $y$  in the equation

$$2 + \log 3 + \log y = \log 5 + 1$$

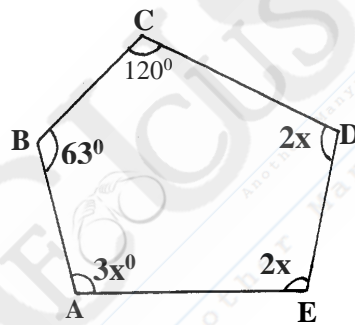
(3mks)

6. Find the equation of the perpendicular bisector of the line segment passing through the points  $A(4,3)$  and  $B(2,7)$  giving your answer in the form  $y = mx + c$  (4mks)

7. If  $\frac{1}{2} \sin (2x + 30)^\circ = 0.4216$ , obtain the value of  $x$  for which  $0 \leq x \leq 180^\circ$  (3mks)

8. The diameter of a circle to 2 s.f is given by 2.8cm. By taking  $\pi = 3.142$ , calculate the percentage error in the determination of its perimeter correct to 4 d.p (3mks)

9. The figure below shows the angles of a polygon **ABCDE**.



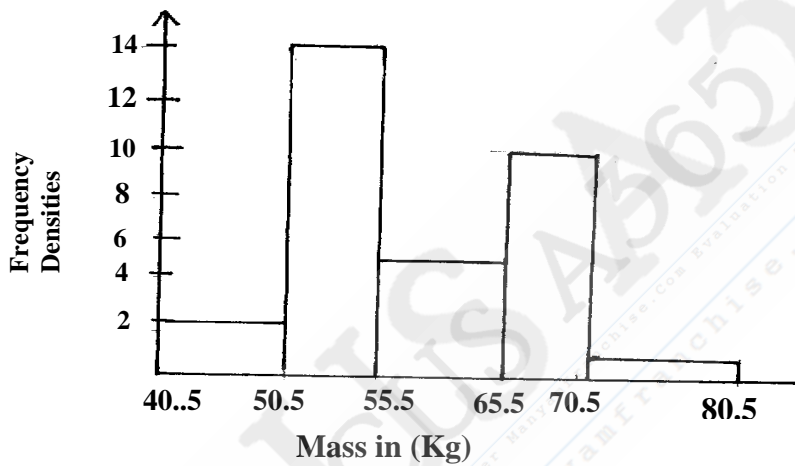
Obtain the size of each of the following angles,

(i)  $\angle BAE$  (2mks)

(ii)  $\angle CDE$  (1mk)

10. Determine the equation of the normal to the curve  $y = x^2 - 3x + 1$  at a point  $(-2, 3)$  giving your answer in the form  $ax + by = c$  (3mks)

11. The graph below shows frequency densities for the masses of some 200 students selected from a class. Use it to answer the questions that follow:

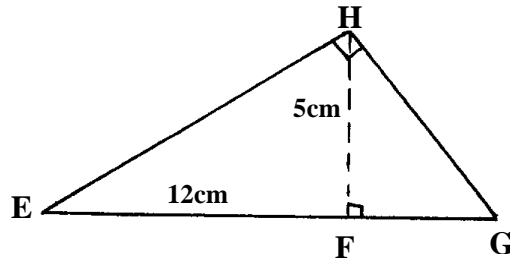


- (a) Complete the frequency distribution table below (2mks)

Mass in (Kg)					
Frequency					

- (b) State the modal frequency (1mk)

12. In the figure below  $\angle EHG = \angle EFH = 90^\circ$ .  $HF = 5\text{cm}$  and  $EF = 12\text{cm}$ . Calculate the length of  $FG$  leaving your answer as a mixed fraction. (3mks)



13. All prime numbers less than 10 are arranged in a descending order to form a number which forms a quotient of 1076 with a certain number. Calculate the number (3mks)

14. Solve for  $t$  in the equation

$$2^{2t+2} - 5(2^t) + 1 = 0$$

(3mks)

15.  $1000\text{cm}^3$  of milk was shared by three children, Nick, Soita and Swalleh in the ratio  $\frac{1}{4} : \frac{1}{2} : \frac{1}{5}$ , What volume did Soita get: (2mks)

16. Under an enlargement with scale factor -3, the point  $P(3, 6)$  is mapped onto  $P^1(7, 18)$ . Find the centre of the enlargement, hence the image of a point  $Q(1,1)$  under the same enlargement. (4mks)

**SECTION II (50 MARKS)**

*Attempt ANY five questions from this section*

17. The distance between two towns **A** and **B** is 760 km. A minibus left town **A** at 8:15a.m and traveled towards **B** at an average speed of 90km/h. A matatu left **B** at 10:35a.m and on the same day and travelled towards **A** at an average speed of 110km/h.

(a)(i) How far from **A** did they meet? (4mks)

(ii) At what time did they meet? (2mks)

(b) A motorist starts from his home at 10:30 a.m on the same day and traveled at an average speed of 100km/h. He arrived at **B** at the same time as the minibus. Calculate the distance from **B** to his home. (4mks)



18. Three towns **X**, **Y** and **Z** are such that **X** is on a bearing of  $120^{\circ}$  and 20km from **Y**. Town **Z** is on a bearing of  $220^{\circ}$  and 12km from **X**
- (a) Using a scale of 1cm to represent 2km, show the relative position of the places (3mks)
- (b) Find;
- (i) The distance between **Y** and **Z** (2mks)
- (ii) The bearing of **X** from **Z** (1mk)
- (iii) The bearing of **Z** from **Y** (1mk)
- (iv) The area of the figure bounded by **XYZ** (3mks)

19. A jet flies from town **Q** ( $60^{\circ}\text{S}$ ,  $24^{\circ}\text{E}$ ) to town **R** ( $60^{\circ}\text{S}$ ,  $10^{\circ}\text{W}$ ) and then due north for 1200 nautical miles to town **S**

(a) Obtain the latitude of **S** (3mks)

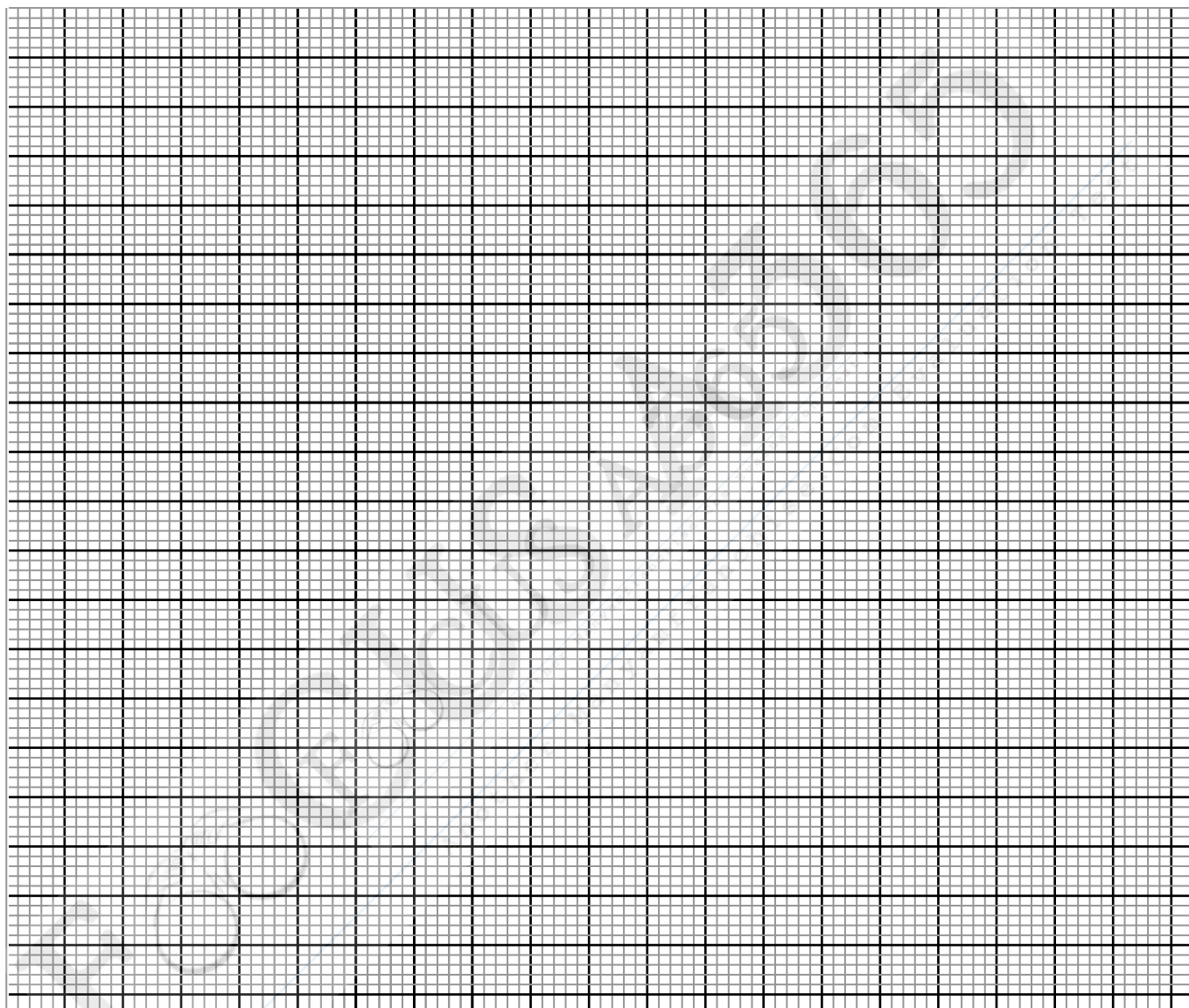
(b) Calculate the distance between **Q** and **R** in

(i) Nautical miles (3mks)

(ii) Km (2mks)

(c) Find the total flight time if the jet flies at an average speed of 800 knots (2mks)

20. Draw the graph of  $y = 2x^2 - 3x - 5$  taking the values of  $x$  in the interval  $-2 \leq x \leq 4$ . (5mks)

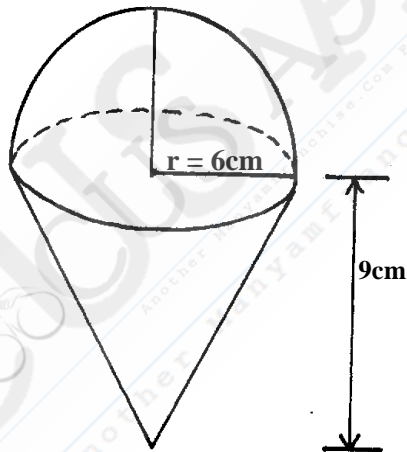


- (a) State the turning point of the graph and state whether it is a maximum or a minimum. (2mks)
- (b) Use the graph in question a to solve the equation  $2x^2 - 3x - 5 = 0$  (2mks)
- (c) Using a suitable straight line, solve the equation  $2x^2 - 5x - 3 = 0$  (1mk)

21 The volume of two similar solid cylinders are  $4096\text{cm}^3$  and  $1728\text{cm}^3$ .

- (a) If the curved surface area of the smaller one is  $112\text{cm}^2$ . Find the height of the larger cylinder if the radius is  $7\text{cm}$ . (4mks)

- b) The diagram below represents a solid made up of a hemisphere mounted on a cone. The radius of the hemisphere and cone are each  $6\text{cm}$ , and the height of the cone is  $9\text{cm}$ .

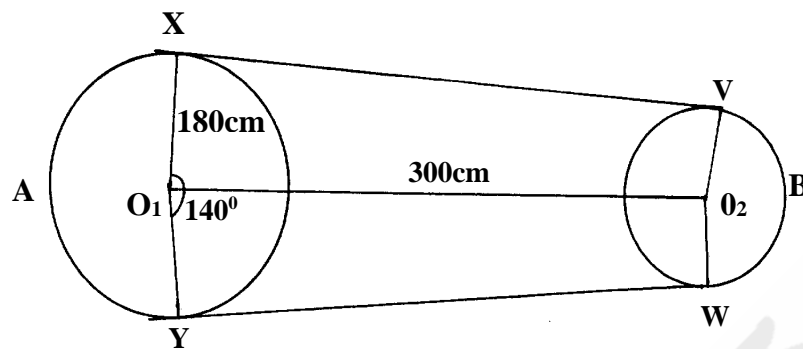


Calculate the volume of the solid. Take  $\pi = \frac{22}{7}$

(6mks)

22. Using a ruler and a pair of compasses only,
- (a) Construct triangle **PQR** such that **PQ** = 5cm, **PR** = 6cm and **QR** = 6.4cm (3mks)
  - (b) Locate the locus of **X** such that it is equidistant from sides **PQ, QR** and **PR** (3mks)
  - (c) Construct the locus **y**, such that it is the shortest distance from **X** to **PQ** (2mks)
  - (d) Using Locus **y**, construct the locus of points **Z** such that it touches the sides **PQ, QR** and **PR** (1mk)
  - (e) A coin is lost within the locus **Z**, shade the region where the coin may not be found. (1mk)

23. The figure below shows a pulley system where a conveyor belt is tied round two wheels. The radius of the larger wheel is 180cm and the distance between the centres of the wheels is 300cm and angle  $\angle XOY = 140^\circ$ .



Determine;

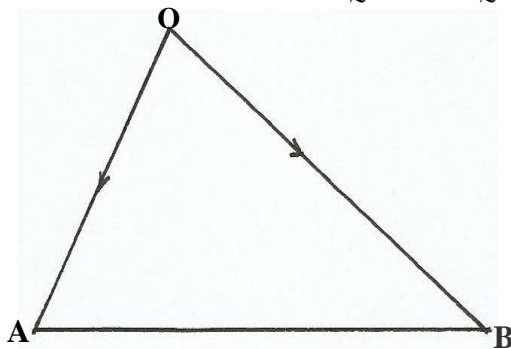
- (a) Length **XV** (3mks)

- (b) **VBW** (3mks)

- (c) **XAY** (2mks)

- (d) Total length of conveyor belt. (2mks)

24. In the diagram below,  $\triangle AOB$  is a triangle such that  $\vec{OA} = \underline{a}$ ,  $\vec{OB} = \underline{b}$  and  $\angle AOB$  is obtuse.



If  $P$  is a point on  $AB$  such that  $\vec{AP} = 3\vec{PB}$  and  $Q$  is the mid-point of  $\vec{OA}$

(a) Express in terms of  $\underline{a}$  and  $\underline{b}$

(i)  $\vec{AB}$

(1mk)

(ii)  $\vec{BQ}$

(2mks)

(b) If  $X$  is a point on  $BQ$  such that  $\vec{BX} = h\vec{BQ}$ , express  $\vec{OX}$  in terms of  $\underline{a}$ ,  $\underline{b}$  and  $h$ , where  $h$  is a scalar

(3mks)

(c) Given further that  $\vec{OX} = k\vec{OP}$  where  $k$  is another scalar, obtain the values of  $h$  and  $k$

(4mks)