2019 MATHEMATICS REVISION KITS

SECTION I (50 MARKS)
Answer all the questions in this section in the spaces provided.

1. Evaluate without using a calculator. (3 Marks)
$$\frac{\frac{5}{6} of \left(4\frac{1}{3} - 3\frac{5}{6}\right)}{\frac{5}{12} x \frac{3}{25} + 1\frac{5}{9} \div 2\frac{1}{3}}$$

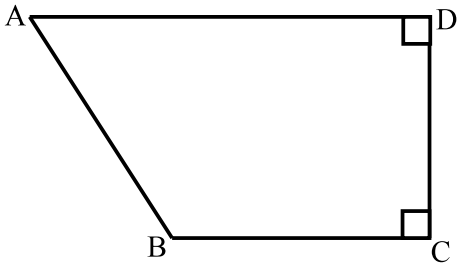
2. Without using a calculator or mathematical tables simplify. (3 Marks)
$$\sqrt{\frac{0.504 \ x \ 14.3 \ x \ 910}{0.28 \ x \ 1.17 \ x \ 28.6 \ x \ 7}}$$

3. Find the value of x if (3 Marks)
$\left(\frac{27}{8}\right)^{x+7} = \left(\frac{4}{9}\right)^{-3x}$

4. Three sirens wail at intervals of thirty minutes, fifty minutes and thirty minutes. If they wail together at 7.18 a.m. on Monday, what time and day will they wail together? (3 Marks)

5. A two-digit number is such that the sum of the ones digit and the tens digit is 10. If the digits are reversed, the number exceeds the original number by 54. Find the number. (3 Marks)

6. The figure below shows quadrilateral ABCD in which AB = 6cm. BC = $\frac{1}{2}$CD, CD = DA and angle ADC = angle BCD = 90^0.



Calculate the area of the quadrilateral ABCD. (4 Marks)

7. The interior angle of a regular polygon is 108^0 larger than the exterior angle. How many sides has the polygon? (3 Marks)

8. A salesman is paid a salary of Sh. 10,000 per month. He is also paid a commission on sales above Sh. 100,000. In one month he sold goods worth Sh. 500,000. If his total earning that month was Sh. 56,000. Calculate the rate of commission. (3 Marks)

9. A cylinder of radius 14cm contains water. A metal solid cone of base radius 7cm and height 18cm is submerged into the water. Find the change in height of the water level in cylinder. (3 Marks)

10. Simplify the following. (3 Marks)
$\frac{2x-4}{12-3x^2} - \frac{1}{3x+6}$

11. A mother is now $2\frac{1}{2}$ times as old as her daughter Mary. Four years ago the ratio of their ages was 3:1. Find the present age of the mother. (3 Marks)

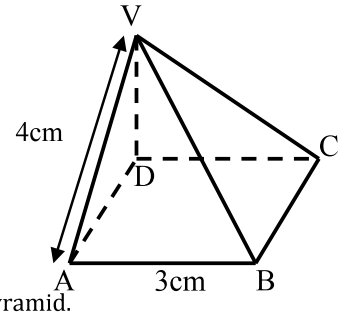
12. The line which joins the point A (3, k) and B (-2, 5) is parallel to the line whose equation is $5y + 2x - 7 = 0$. Find the value of k. (3 Marks)

13. A Kenyan bank buys and sells foreign currencies at the exchange rates shown below.

	Buying (KShs.)	Selling (KShs.)
1 Uuro	147.86	148.00
1 US Dollar	74.22	74.50

An American arrived in Kenya with 20 000 Euros. He converted all the Euros to Kenya shillings at the bank. He spent KShs. 2,512,000 while in Kenya and converted the remaining Kenya shillings into US Dollars at the bank. Find the amount in Dollars that he received. (3 Marks)

14. The diagram below represents a right pyramid on a square base of side 3cm. The slant edge of the pyramid is 4cm.



(a) Draw a labelled net of the pyramid. (2 Marks)
(b) On the net drawn, measure the height of a triangular face from the top of the pyramid. (1 Mark)

15. Using logarithms tables only, evaluate. (4 Marks)

$$\sqrt[3]{\frac{849.6 \; x \; 2.41}{3941}}$$

16. Use reciprocal and square tables to evaluate, to 4 significant figures, the expression. (3 Marks)

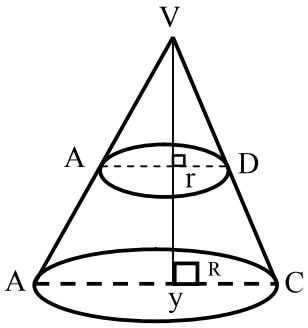
$$\frac{1}{0.3654} - 4.151^2$$

SECTION II (50 MARKS)

Answer only five questions in this section in the spaces provided.

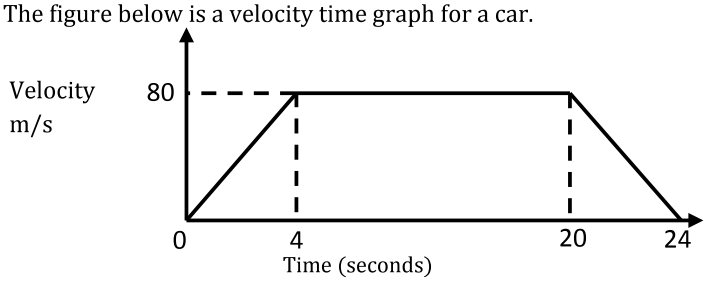
17. A group of people planned to contribute equally towards buying land at a price of Shs 180,000. However 3 members of the group withdrew from the project. As a result, each of the remaining members were to contribute KShs. 3000 more.
(a) Find the original number of members in the group. (6 Marks)
(b) How much would each person have contributed if the 3 people had not withdrawn. (2 Marks)
(c) Calculate the percentage increase in the contribution per person caused by the withdrawal. (2 Marks)

18. The figure below shows a cone from which a frustum is made. A plane parallel to the base cuts the cone two thirds way up the vertical height of the cone to form frustum ABCD. The top surface radius of the frustum is labelled r and the bottom radius R.



(a) Find the ratio r:R. (1 Mark)
(b) Given that r = 7cm, find R. (2 Marks)
(c) If the height VY of the original cone is 45cm. Calculate to the nearest whole number the volume of the frustum. (Take $\pi = \frac{22}{7}$) (4 Marks)
(d) The frustum represents a bucket which is used to fill a rectangular tank measuring 1.5m long, 1.2m wide and 80cm high with water. How many full buckets of water are required to fill the tank. (3 Marks)

19. (a) The figure below is a velocity time graph for a car.



(i) Find the total distance travelled by the car. (2 Marks)
(ii) Calculate the deceleration of the car. (2 Marks)
(b) A car left Nairobi towards Eldoret at 7.12 a.m. at an average speed of 90km/h. At 8.22 a.m, a bus left Eldoret for Nairobi at an average speed of 72km/hr. The distance between the two towns is 348km. Calculate:
(i) the time when the two vehicles met. (4 Marks)
(ii) the distance from Nairobi to the meeting place. (2 Marks)

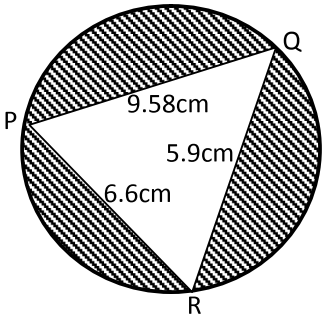
20. The following distribution shows the marks obtained by 82 students in a Mathematics test.

Marks	20-29	30-39	40-49	50-59	60-69	70-79	80-89
Frequency	3	18	13	14	17	12	5

(a) State the modal class. (1 Mark)
(b) Calculate to 2 decimal places:
(i) the mean mark (4 Marks)
(ii) the difference between the median and the mean marks. (5 Marks)

21. John bought 3 brands of tea; A, B and C. The cost price of the three brands were Sh. 25, Sh. 30 and Sh. 45 per kilogram respectively. He mixed the three brands in the ratio 5:2:1 respectively. After selling the mixture, he made a profit of 20%.
(a) How much profit did he make per kilogram of the mixture? (4 Marks)
(b) After one year the cost price of each brand was increased by 10%.
(i) For how much did he sell one kilogram of the mixture to make a profit of 15%?
(Give your answer to the nearest 5 cents) (3 Marks)
(ii) What would have been his percentage profit if he sold one kilogram of the mixture at Sh. 45. (3 Marks)

22. Triangle PQR is inscribed in the circle. PQ = 7.8cm, PR = 6.6cm and QR = 5.9cm.

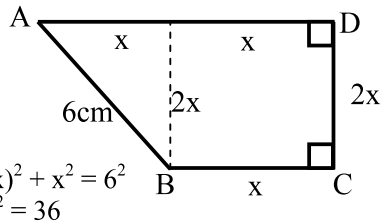


Find;
(a) size of angle QPR (3 Marks)
(b) the radius of the circle. (3 Marks)
(c) the area of the shaded region. (4Marks)

23. P, Q and R are three villages such that PQ = 10km, QR = 8km and PR = 4km are connecting roads.
(a) Using a scale of 1cm to represent 1km, locate the relative positions of the three villages. (2 Marks)
(b) A water tank T is to be located at a point equidistant from the three villages. By construction locate water tank T and measure its distance from R. (2 Marks)
(c) Determine the shortest distance from T to the road PQ by construction. (2 Marks)
(d) Determine the area enclosed by the roads PQ, QR and PR by calculation. (3 Marks)

24. Triangle PQR has vertices at P (2,3), Q(1,2) and R(4,1), while triangle $P^IQ^IR^I$ has vertices $P^I(-2,3)$,$Q^I(-1,2)$, $R^I(-4,1)$
(a) (i) Draw triangle PQR and $P^IQ^IR^I$ on the grid provided. (2 Marks)
(ii) Describe fully a single transformation which maps triangle PQR onto triangle $P^IQ^IR^I$. (1 Mark)
(b) (i) On the same grid, draw triangle $P^{II}Q^{II}R^{II}$ the image of PQR under a reflection on the line y + x = 0 (2 Marks)
(ii) Describe fully a single transformation which maps triangle $P^{II}Q^{II}R^{II}$ onto triangle PIQIRI. (1 Mark)

MARKING SCHEME

1.	$\frac{\frac{5}{6}\ of\ \left(\frac{13}{3}-\frac{23}{6}\right)}{\frac{5}{12}\ x\ \frac{3}{25}+\frac{14}{9}\ x\ \frac{3}{7}}$ $=\frac{\frac{5}{6}x\frac{3}{6}}{\frac{1}{20}+\frac{2}{3}}$ $=\frac{\frac{5}{12}}{\frac{43}{60}}$ $=\frac{5}{12}\ x\ \frac{60}{43}$ $=\frac{25}{43}$	M1 M1 A1	5	x + y = 10 (10y + x) – (10x + y) = 54 9y - 9x = 54 y – x = 6 x + y = 10 -x + y = 6 2y = 16 y = 8 x = 2 Number is 28	M1 M1 A1
		03			3
2.	$\sqrt{\frac{\cancel{28}^{2}\cancel{04}\ x\ \cancel{14}^{1}\cancel{3}\ x\ 910\ x\ 10}{\cancel{28}^{1}\ x\ 117\ x\ \cancel{286}^{2}\ x\ 7}}$ $=\sqrt{\frac{\cancel{18}^{9}\ x\ \cancel{910}^{130}\ x\ 10}{117\ x\ \cancel{2}^{1}\ x\ \cancel{7}^{1}}}$ $=\sqrt{\frac{9\ x\ 13\ x\ 100}{117}}$ $=\sqrt{100}$ = 10	M1 M1 A1	6	 $(2x)^2 + x^2 = 6^2$ $5x^2 = 36$ x = 2.683 Area = $\frac{1}{2}$(x + 2x)(2x) = $\frac{1}{2}$(3 x 2.683) (2 x 2.683) = 21.595467 ≈ 21.60 units	M1 A1 M1 A1
		03			04
3.	$\left(\frac{3^3}{2^3}\right)^{x+7}=\left(\frac{2^2}{3^2}\right)^{-3x}$ $\left(\frac{3}{2}\right)^{3(x+7)}=\left(\frac{3}{2}\right)^{6x}$ 3(x + 7) = 6x 3x + 21 = 6x x = 7	M1 M1 A1	7	Inter. ∠ = x Exter. ∠ = y $x + y = 180^0$ $x – y = 108^0$ 2x = 288 $x = 144^0$ $\therefore$ ext. $\angle 36^0$ No. of sides = $\frac{360}{36}$ = 10 sides	B1 M1 A1
		03			
4.	30 = 2 x 3 x 5 50 = 2 x 5^2 35 = 5 x 7 L.C.M = 2 x 3x 5^2 x 7 = 1050 mins 17 hrs 30 mins Time = 7.18 +17.30 2448 ⇒ 12.48 a.m. Tuesday	B1 M1 A1	8	Let the commission be x% $\frac{x}{100}$ (500000 – 100000) = 4000x 4000x + 10000 = 56000 x = 12.5%	M1 M1 A1
			9	Vol. cylinder ⇒ $\pi(14^2)$h Vol. cone ⇒ $\frac{1}{3}\pi(7^2)$ x 18 $\pi(14^2)h = \frac{1}{3}\pi(7^2)$ x 18 h = $\frac{1}{3}$ x 7^2 x 18 x $\frac{1}{14^2}$ h = 1.5cm	M1 M1 A1
		03			

10.

$\frac{2x-4}{12-3x^2} - \frac{1}{3x+6}$ — M1

$\frac{2(x-2)}{3(2-x)(2+x)} - \frac{1}{3(x+2)}$ — M1

$-\frac{2}{3(2+x)} - \frac{1}{3(x+2)}$ — A1

$= -\frac{1}{x+2}$

03

11.

	Present	4 yrs ago
Daugther	$\Rightarrow x$	$x-4$
Mother	$\Rightarrow 2.5x$	$2.5x-4$

$\frac{x-4}{2.5x-4} = \frac{1}{3}$ — M1

$3x - 12 = 2.5x - 4$ — A1

$0.5x = 8$

$x = 16$

Mother $= 2.5 \times 16$ — B1

$= 40$ years

3

12.

$5y + 2x - 7 = 0$

$y = -\frac{2}{5}x + \frac{7}{5}$

Gr. Line $= -\frac{2}{5}$ — B1

$\frac{k-5}{3--2} = \frac{-2}{5}$ — B1

$k - 5 = -2$ — A1

$k = 3$

03

13.

20000×147.86 — M1

$= 2,957,200$

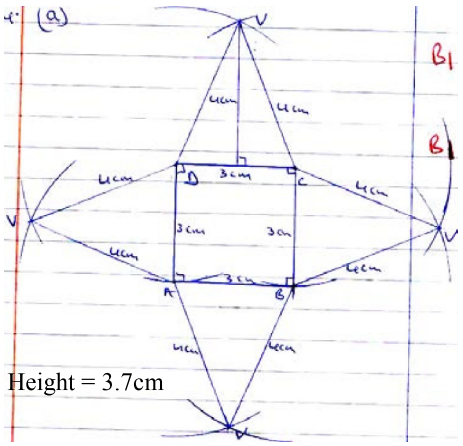
$\frac{2957200 - 2512000}{74.50}$ — M1

$= 5975.84$ — A1

03

14.

(a)



(c) Height = 3.7cm

15.

No.	Log	
849.6	2.9292	M1
2.41	0.3820+	
	3.3112	
3941	3.5956-	M1
	$\bar{1}.7156$	
	$\div 3$	M1
8.039×10^{-1}	$\bar{1}.9052$	A1
	$= 0.8039$	

16.

$\frac{1}{0.3654} - 4.151^2$ — B1

$\frac{1}{0.3654} \Rightarrow 2.737$ } — M1

$4.151^2 \Rightarrow 17.231$ } — A1

$2.737 - 17.231$

$= -14.494$

17.

(a) Original members $= x$ — B1

Original each $= \frac{180000}{x}$ — B1

Later each $= \frac{180,000}{x-3}$ — M1

$\frac{180,000}{x-3} - \frac{18000}{x} = 3000$

$\frac{60}{x-3} - \frac{60}{x} = 1$ — M1

$60x - 60x + 180 = x^2 - 3x$ — M1

$x^2 - 3x - 180 = 0$ — A1

$(x - 15)(x + 12) = 0$

$x = 15$ — M1

(b) $\frac{180,000}{15} = 12000$ — A1

(c) Increase $= 3000$ — M1

$\frac{3000}{12000} \times 100 = 25\%$ — A1

18.

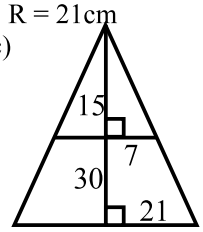
(a) r : R

$= 1:3$ — B1

(b) $\frac{7}{R} = \frac{1}{3}$ — M1

$R = 21$cm — A1

(c)



Vol. Big cone $= \frac{1}{3} \times \frac{22}{7} \times 21^2 \times 45$ — M1

$= 20790\text{cm}^3$ — M1

Vol. Small cone $= \frac{1}{3} \times \frac{22}{7} \times 7^2 \times 15$ — M1

$= 770\text{cm}^3$

Vol. of frustrum $= 20790 - 770$ — M1

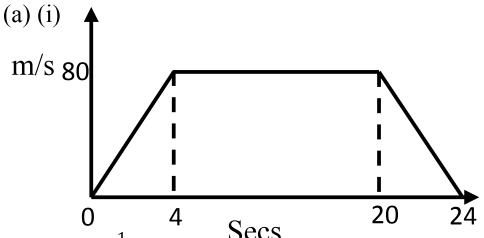
$= 20020\text{cm}^3$ — A1

(d) Vol. tank $= 150 \times 120 \times 180$ — B1

Buckets $= \frac{150 \times 120 \times 80}{20020} = 71.93$

$\cong 72$ full buckets

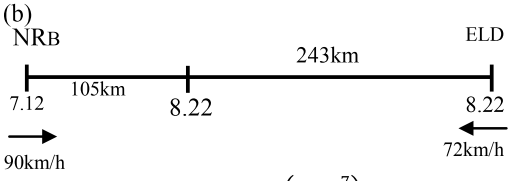
19. (a) (i)



Distance $= \frac{1}{2}(16 + 24) \times 80$ — M1
$= 1600$m — A1

(ii) $-\frac{80}{4}$ — M1
$= -20$m/s^2 — A1

(b)



Relative distance $= 348 - \left(90x\frac{7}{6}\right)$ — B1
$= 243$km
Relative speed $= 162$km/hr — M1
Time taken $= \frac{243}{162}$hrs
$= 1.5$ hrs — M1
Time $= 8.22 + 1$hr 30 mins — A1
$= 9.52$ a.m. — M1

(c) $90 \times 2\frac{2}{3}$km $= 240$km — A1

20. (a) (i) Modal class $= 30 - 39$ — B1

Marks	x	f	fx	cf
20-29	24.5	3	73.5	3
30-39	34.5	18	621	21
40-49	44.5	13	578.5	34
50-59	54.5	14	763	48
60-69	64.5	17	1096.5	65
70-79	74.5	12	894	77
80-89	84.5	5	422.5	82
			4449	

B1

B1

Mean $= \frac{4449}{82}$ — M1
$= 54.2561$
$\cong 54.26$ — A1

(ii) Median $= 49.5 + \frac{41-34}{14} \times 10$ — B1
$= 54.5$

Diff $= 54.5 - 54.26$ — M1
$= 0.24$ — A1

21 (a) A : B : C
25=: 30/= : 45/=
5 : 2 : 1

$100\% = \frac{(5 \times 25) + (30 \times 2) + (45 \times 1)}{5+2+1} = 28.75$/=

20% profit
$= \frac{20}{100} \times 28.75 = \underline{5.75/=}$

(b) A = 27.5/=
B = 33/=
C = 49.5/=

$\therefore 100\% = \frac{(27.5 \times 5) + (33 \times 2) + (49.5 \times 1)}{5+2+1} = 31.625$

% Profit $= 1.15 \times 31.625$
$= 36.36875$
$\cong 36.50$

10

(c) $45 - 36.50$
$= 8.50$
% Profit $= \frac{8.5}{36.5} \times 100$
$= 23.29\%$

22. (a) $5.9^2 = 7.8^2 + 6.6^2 - 2(7.8)(6.6)\cos P$ — M1
$\cos P = \frac{69.59}{102.96}$ — M1
$P = 47.48^0$ — A1

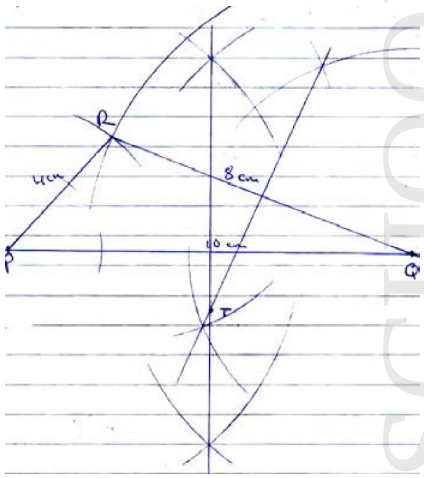
(b) $\frac{5.9}{Sin\,47.48^0} = 2R$ — M1

$R = \frac{5.9}{2Sin\,47.48^0}$ — M1

$= 4.002$cm — A1

(c) Area of $\Delta = \frac{1}{2} \times 7.8 \times 6.6 \times \text{Sin } 47.48^0$ — M1
$= 18.97cm^2$
Area of circle $= 3.142 \times 4.002^2$ — M1
$= 50.32$
Shaded area $= 50.32$ — M1
$\underline{-18.97}$
31.35cm^2 — A

23. (a)



B1

B1

(b) Construction of any 2 ⊥ side bisectors — B1
✓Location of T
Distance RT = 5.2km — B1

(c) Drop ⊥ from T to PQ — B1
Distance = 1.5km

(d) $S = \frac{10+8+4}{2}$ — B1
$= 11$km

$A = \sqrt{11(11-10)(11-8)(11-4)}$ — B1
$= 15.19868$km^2 — M1
$\cong 15.20$km^2 — A1

24	(a) (i) ✓PQR drawn ✓$P^IQ^I R^I$ drawn (ii) Reflection on the line y – axis (or x = 0) (b) (i) $P^{II}(-3,-2)$ $Q^{II}(-2,-1)$ $R^{II}(-1,-4)$ ✓ $\Delta P^{II}Q^{II}R^{II}$ drawn (ii) Negative quarter turn about (0,0) OR (270^0) turn about (0,0) OR – 90^0 turn about (0,0) (c) $P^{III}(3,-2)$ $Q^{III}(2,-1)$ $R^{III}(1,-4)$ ✓$\Delta P^{III}Q^{III}R^{III}$ drawn (d) PQR and $P^IQ^IR^I$ PQR and $P^{II}Q^{II}R^{II}$ $P^IQ^IR^I$ and and $P^{III}Q^{III}R^{III}$ $P^{II}Q^{II}R^{II}$ and $P^{III}Q^{III}R^{III}$	B1 B1 B1 B1 B1 B1 B1 B1 B2