



ITL PUBLIC SCHOOL

Periodic Test-3 (2020-21)

Date: 09.12.2020

Class: X

Mathematics (Code-041)


Time: 2 Hour

M.M: 40

General Instructions:

- Read the question paper carefully and answer legibly.
- All questions are compulsory.
- The question paper consists of 19 questions divided into two parts A and B.
- **Part A** consists of two sections I and II. Section I has 9 questions of 1 mark each. Internal choices are provided in 2 questions. Section II has 2 questions on case study. Each question has 5 case - based sub - parts. An examinee has to attempt any 4 out of 5 sub-parts.
- **Part B** consists of 3 questions of 2 marks, 4 questions of 3 marks and 1 question of 5 marks each.
- Internal choice is provided in 1 question of 2 marks, 1 question of 3 marks and 1 question of 5 marks.

Part-A		
SECTION – I		
Section I has 9 questions of 1 mark each. Internal choice is provided in 2 questions.		
1	<p>In the given figure, $MN \parallel RQ$. If $PM = x$ cm, $MR = 10$ cm, $PN = (x-2)$ cm, $NQ = 6$ cm, then calculate the value of x.</p>	1
2	<p>Compute the 10th term of the Arithmetic Progression $\sqrt{3}, \sqrt{12}, \sqrt{27} \dots$ OR The nth term of an AP is $7 - 4n$. Find its common difference.</p>	1
3	<p>A kite is flying at a height of 30 m from the ground. The length of the string from kite to the ground is 60 m. assuming that there is no slack in the string, find the angle of elevation of the kite at the ground.</p>	1

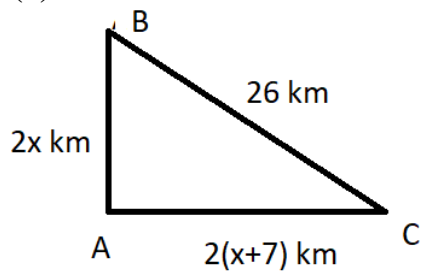
4	Prove that $(\sec A + \tan A)(1 - \sin A) = \cos A$	1
5	Given that $\Delta ABC \sim \Delta PQR$. Also, $\text{ar}(\Delta ABC) = 4 \text{ ar}(\Delta PQR)$. If $BC = 12 \text{ cm}$, find QR .	1
6	<p>If $\cos A = \frac{2}{5}$, find the value of $4 + 4 \tan^2 A$.</p> <p style="text-align: center;">OR</p> <p>Given $\sin A = \frac{12}{37}$, find $\cos A$ and $\tan A$.</p>	1
7	Find the height of the tower, if the angle of elevation of its top from a point on the ground, which is at a distance of 100 m from the foot of the tower, is 60° .	1
8	If the 17 th term of an AP exceeds its 10 th term by 7. Find the common difference.	1
9	“Given that $\sin A = \frac{\sqrt{3}}{2}$ and $\cos B = \frac{\sqrt{3}}{2}$, then value of $\tan(A+B)$ will be not defined”. Justify above statement with valid reasons.	1
	<p style="text-align: center;">SECTION - II (Case Study)</p> <p>Case study- based questions are compulsory. Attempt any 4 sub- parts from each question. Each sub-part carries 1 mark.</p>	
10	<p>Case Study based-1</p> <p style="text-align: center;"><u>MATHEMATICAL CARD GAME</u></p> <p>Sameer and Aisha were feeling bored during the lockdown. So, they started balancing cards in the form of stacks as shown in the figure below:</p>  <p>Sameer took 56 cards and stacked in such a manner so that 14 cards are in the bottom row, 12 in the row above it, 10 in the row next to it.</p>	4

	<p>(i) If Sameer continues in that manner then the total number of rows in which he will be able to stack 56 cards is</p> <p>a) 7 b) 6 c)8 d) 9</p> <p>(ii) The number of cards in the top most row in Sameer's stack is</p> <p>a) 4 b) 6 c) 1 d) 2</p> <p>(iii) Aisha took few cards and arranged 20 cards in the first row, 18 cards in the row above it and continued in the same manner such that there are 4 cards in the top most row. Then, the total number of rows in Aisha's stack is</p> <p>a) 8 b) 9 c)10 d) 11</p> <p>(iv) The total number of cards in Aisha's stack is</p> <p>a) 76 b) 96 c) 108 d) 100</p> <p>(v) The mathematical concept applied in solving the above problem is</p> <p>a) Linear Equations b) Probability</p> <p>c) Arithmetic Progressions d) Coordinate Geometry</p>	
11	<p>Case Study based-2</p> <p style="text-align: center;">CONSTRUCTING A HIGHWAY</p> <p>For going to a city B from city A, there is a route via city C such that $AC \perp CB$, $AC = 2x$ km and $CB = 2(x + 7)$ km. Ayush works as a civil engineer in NHAI (National Highways Authority of India). He has proposed to construct a 26 km highway which directly connects two cities A and B.</p>	4

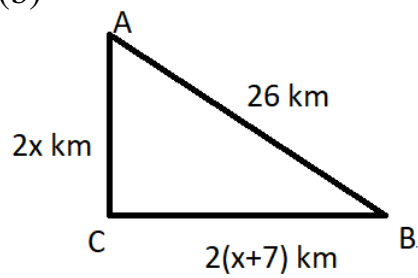


(i) Ayush draws a figure to represent the above situation. Choose the correct figure out of the options given below:

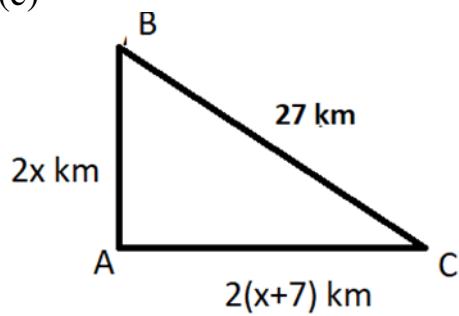
(a)



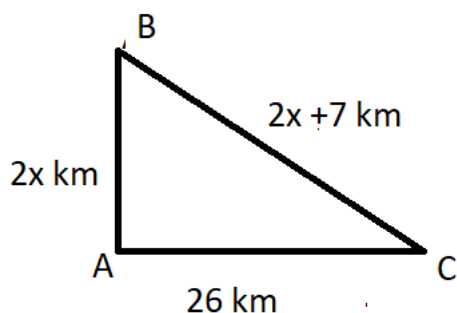
(b)



(c)



(d)



(ii) The equation which represents the above situation algebraically is

(a) $x^2 + 7x - 60 = 0$

(b) $x^2 + 5x - 60 = 0$

(c) $8x^2 + 7x - 60 = 0$

(d) $x^2 + 2x - 60 = 0$

(iii) The distance between city A and city C is

(a) 15 km

(b) 12 km

(c) 8 km

(d) 10 km

(iv) The distance between city A and city B via city C is

(a) 25 km

(b) 34 km

(c) 24 km

(d) 21 km

(v) Find how much distance will be saved in reaching city B from city A after the construction of the highway.

(a) 10 km

(b) 2 km

(c) 8 km

(d) 16 km

Part –B

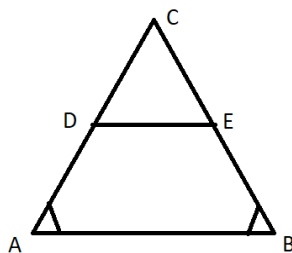
All questions are compulsory. In case of internal choices, attempt any one

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If D is a point on the side BC = 12 cm of a ΔABC such that BD = 9 cm and $\angle ADC = \angle BAC$, then find the length of AC.

OR

In the figure given below, if AD = BE and $\angle A = \angle B$. Prove that $DE \parallel AB$.



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13	Find the value of the middle term of the following AP: -6, -2, 2,58.	2
14	Using the formula $\sin (A- B) = \sin A \cos B - \cos A \sin B$, find the value of $\sin 15^\circ$.	2
15	Using AP, find the sum of all 3 – digit natural numbers which are the multiples of 7.	3
16	Prove that: $\frac{\sin A - 2\sin^3 A}{2\cos^3 A - \cos A} = \tan A$	3
17	In an equilateral triangle ABC, D is a point on side BC such that $BD = \frac{1}{3} BC$. Prove that $9AD^2 = 7 AB^2$. OR If AD and PM are medians of triangles ABC and PQR respectively where $\Delta ABC \sim \Delta PQR$, prove that $\frac{AB}{PQ} = \frac{AD}{PM}$.	3
18	Find the value of $\frac{2 \cos^2 90^\circ + 4 \cos^2 45^\circ + \tan^2 60^\circ + 3 \operatorname{cosec}^2 60^\circ + 1}{3 \sec 30^\circ - \frac{7}{2} \sec^2 45^\circ + 2 \operatorname{cosec} 30^\circ - 1}$	3
19	A 1.2 m tall girl spots a balloon moving with the wind in a horizontal line at a height of 88.2 m from the ground. The angle of elevation of the balloon from the eyes of the girl at any instant is 60° . After some time, the angle of elevation reduces to 30° . Find the distance travelled by the balloon during the interval. OR A straight highway leads to the foot of a tower. A man standing at the top of the tower observes a car at an angle of depression of 30° , which is approaching the foot of the tower with a uniform speed. Six seconds later, the angle of depression of the car is found to be 60° . Find the time taken by the car to reach the foot of the tower from this point.	5