**CRITIRCAL AND CREATIVE THINKING ITEMS**

**CLASS VII : CHAPTER 5 : LINES AND ANGLES**

**INDEX**

|  |  |
| --- | --- |
| **S.No.** | **Theme of the item** |
|  | **ANGLE BETWEEN WALLS** |
|  | **ARCHERY** |
|  | **YOGA** |
|  | **PARKING AREA** |
|  | **TANGRAM- A GEOMETRICAL PUZZLE** |
|  | **ROAD MAP** |
|  | **QUIZ IN QUICK ROUND** |
|  | **SELLING BOOKS** |
|  | **PIZZA** |
|  | **GOAL POST AND GOLI** |
|  | **ECO-FRIENDLY HOUSE** |
|  | **WAY TO FRIEND’S HOUSE** |

**1.ANGLE BETWEEN WALLS**

|  |  |
| --- | --- |
| **Domain** : Mathematical Literacy | **Theme** : Lines and angles |
| Class : VII | Expected time : 6min. |
| Description of item : Image, Text | Learning outcome : understanding and use of linear pair and vertically opposite angles |



C

wall

wall

E

D

B

A

Inorder to figure out the angle ACD at which the two walls meet Raj keeps two straight canes AE and BD against the walls. He discovers that angle DCE is only four-fifth of angle BCE.

1. What is the measurement of angle ACD?
2. What is the measurement of angle DCE?

**Credit pattern** :

Full credit :02

Partial credit : 01

No credit : 0

**Answers :**

1. Angle ACD = Angle BCE

Angle BCE + angle DCE = 180

Angle DCE = angle BCE

Angle BCE + angle BCE = 180 [1]

Angle BCE = 100

angle ACD = 100 [1]

1. Angle DCE = X 100 = 80 [2]

|  |  |
| --- | --- |
| Frame work | Characteristics |
| Competency | Connecting |
| Overarching idea | change and relationship |
| Context | life related |
| Item format | short response item |
| Cognitive process | interpreting, problem solving |

|  |
| --- |
| **2. ARCHERY** |

|  |  |
| --- | --- |
| **Domain** : Mathematical Literacy | **Theme** : Lines and angles |
| Class : VII | Expected time : 6min. |
| Description of item : Image, Text | Learning outcome : understanding and use of parallel lines property |

Archery is the art, sport, practice, or skill of using a bow to shoot arrows. The word comes from the Latin arcus. Historically, archery has been used for hunting and combat. In modern times, it is mainly a competitive sport and recreational activity.A person who participates in archery is typically called an archer or a *bowman*.



Pranav, Nivedya and Sam were practicing archery.They were shooting arrows from different positions.After first round the arrows shot by them hit the target as shown below



**Arrow C**

**Arrow B**

**Arrow A**

arrows A and B are in parallel to the ground and arrow C cuts across the other two arrows.If the larger angle made by arrows A and C are 1500.

1. What is the angle at which the third archer launched arrow C
2. What is the smaller angle made by the arrows B and C

**Credit pattern :**

Full credit :02

Partial credit : 01

No credit : 0

**Answers:**

Since larger angle made by arrows A and C are 1500,smaller angle made by the arrows A and C are 300.

smaller angle made by the arrows B and C = 300 [answer of (b)] [2]

the angle at which the third archer launched arrow = 300 (corresponding angle) [2]

|  |  |
| --- | --- |
| **Frame work** | **Characteristics** |
| Competency | Connecting |
| Overarching idea | Quantity |
| Context | Sports |
| Item format | problem solving |
| Cognitive process | Analysis |
| Proficiency level | 2 |

|  |
| --- |
| **3. YOGA** |

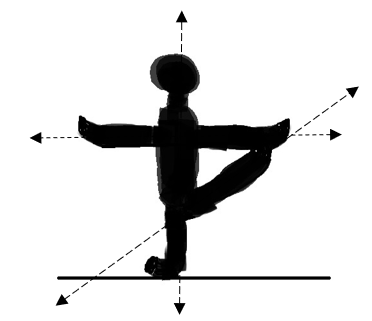
|  |  |
| --- | --- |
| **Domain** : Mathematical Literacy | **Theme** : Lines and angles |
| Class : VII | Expected time :6min. |
| Description of item : Image, Text | Learning outcome : understanding and use of angle sum property and linear pair |

Yoga is an old form of discipline from India.It is both spiritual and physical. Yoga uses breathing techniques,exercise and meditation. It helps to improve health and happiness.Yoga is the Sanskrit word for union. Patanjali was a pioneer of classical yoga.

A person doing yoga will move from one posture(called asana) to another.eg.”sun – salutation” contains 12 poses of asanas, one after the other, and is said to help balance body and soul. The “sun – salutation” is popularly known as “Suryanamaskar”.

****

Krithika will do Yoga daily in morning.Following figure shows one of the asana done by her.In this asana her arms are parallel to the floor.Her supporting leg makes a 900 with the floor and legs form an angle of 1300.



Determine the angle formed by Krithika’s

1. Left arm and body
2. Leg and arm

**Credit pattern :**

Full credit :02

Partial credit : 01

No credit : 0

**Answers :**

1. 900
2. 400

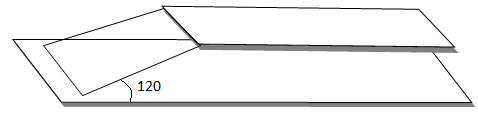
|  |  |
| --- | --- |
| **Frame work** | **Characteristics** |
| Competency | Connection |
| Overarching idea | change and relationship |
| Context | Exercise |
| Item format | problem solving |
| Cognitive process | Application |
| Proficiency level | 4 |

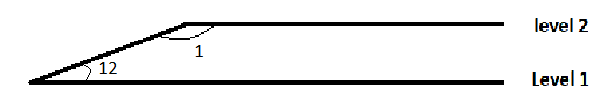
**4. PARKING AREA**

|  |  |
| --- | --- |
| **Domain** : Mathematical Literacy | **Theme** : Lines and angles |
| Class : VII | Expected time : 6min. |
| Description of item : Image, Text | Learning outcome : understanding and use of parallel lines and properties |

There are two levels of parking lot in a mall.A ramp rises to connect the two horizontal levels of parking i.e,level 1 to level 2.The ramp makes an angle of120 with the horizontal of level1.What is the measure of

1. Angle1
2. If the ramp makes an angle of 300 with the horizontal what will be the measurement of angle 1





**Credit pattern :**

Full credit :02

Partial credit : 01

No credit : 0

**Answers:**

1. Angle 1= 1680
2. Angle 1 = 1500

|  |  |
| --- | --- |
| **Frame work** | **Characteristics** |
| Competency | Connections |
| Overarching idea | Space and shapes |
| Context | Real life situations |
| Item format | Short response |
| Cognitive process | Interpreting |
| Proficiency level | 3 |

**5. TANGRAM- A GEOMETRICAL PUZZLE**

|  |  |
| --- | --- |
| **Domain** : Mathematical Literacy | **Theme** : Lines and angles |
| Class : VII | Expected time : 5min. |
| Description of item : Image, Text | Learning outcomes: understanding parallel lines and transversal. |

Tangram is a Chinese geometrical puzzle consisting of a square cut into seven pieces which can be arranged to make various other shapes. There are many benefits to play with tangram .They can also be used to develop problem solving and logical thinking skills.

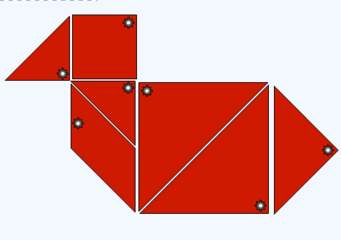
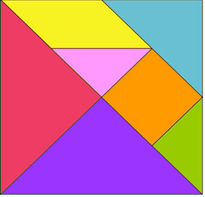


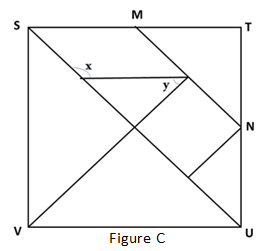
Figure A – TangramFigure B

i)How many triangular pieces are there in a Tangram ?

a)6 b)5 c)4 d)3

ii)Find the measure of and in figure C?

1. =65° , =90°
2. =107° , =30°
3. =90° , =72°
4. =135° , =45°



iii) Which are the other shapes in a Tangram other than triangles?

iv)In figure C ,is MN parallel to SU ? if yes , justify your answer.

**Credit pattern :**

Full credit :02

Partial credit : 01

No credit : 0

**Ans:**

i) 5

ii)=135° , =45° 1 mark each

iii) Parallelogram and square,1 mark each

vi) SU‖MN, any correct justification, 1 mark each

|  |  |
| --- | --- |
| **Frame work** | **Characteristics** |
| Competency | Connections |
| Overarching idea | Space and shapes |
| Context | Real life situations |
| Item format | Short response |
| Cognitive process | Interpreting |
| Proficiency level | 3 |

**6. ROAD MAP**

|  |  |
| --- | --- |
| **Domain** : Mathematical Literacy | **Theme** : Lines and angles |
| Class : VII | Expected time : 5min. |
| Description of item : Image, Text | Learning outcome : understanding and use of parallel lines and properties |

Road maps show people how they can travel from one place to another. They also show some physical features, such as mountains and rivers and political features, such as cities and towns. Engineers are using road map to construct new roads in cities, towns and villages.



Figure (a)

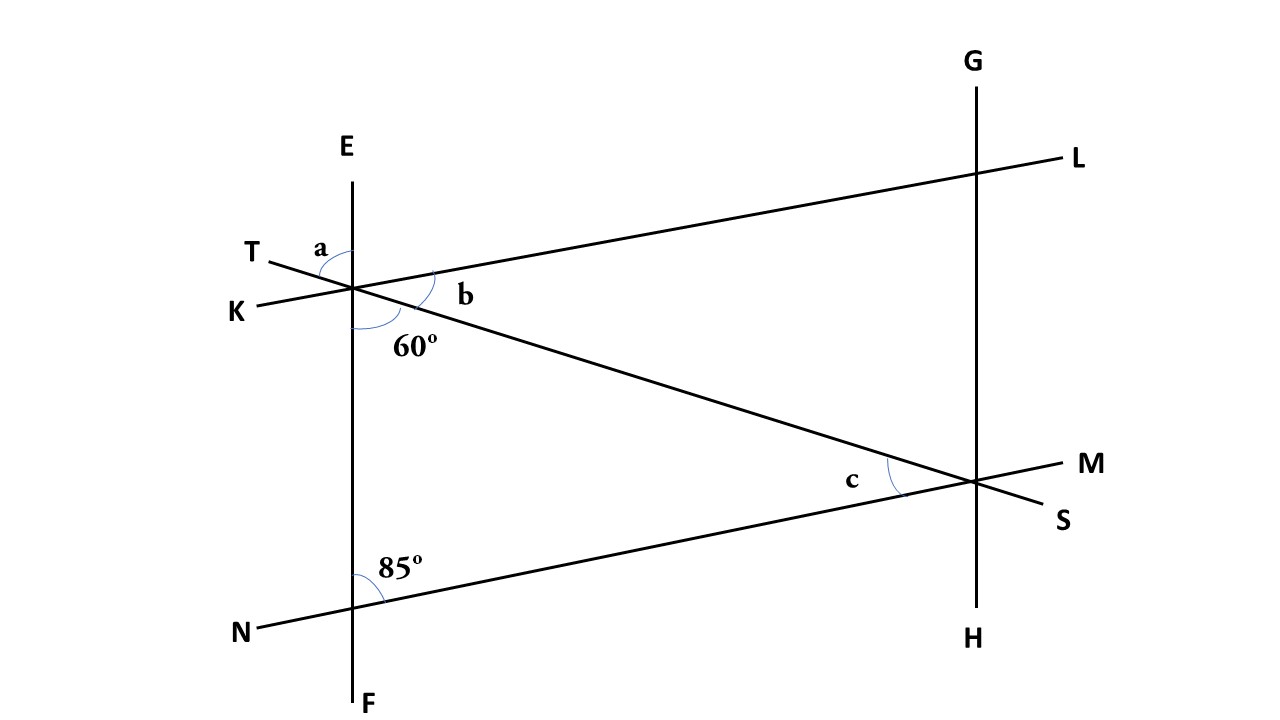


Figure (b)

Figure (b) is a part of figure (a),in which line segments EF,GH,KL ,NM &TS represents roads . Here KL⎪⎪NM. Can you find any other pair of parallel roads?

1. Find the angle measure of a and b .justify your answer.
2. Find the measure of c. Explain a method to draw a line parallel to a given line .

**Credit pattern :**

Full credit :02

Partial credit : 01

No credit : 0

**Answers:**

i) 1 pair, EF‖GH , Full credit

ii)60° ,b=35°, 1 mark each

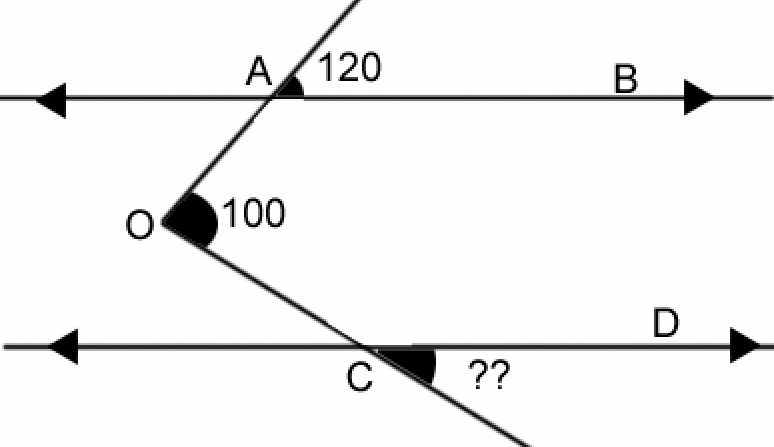
iii) c=35° any correct method. 1 mark each

|  |  |
| --- | --- |
| **Frame work** | **Characteristics** |
| Competency | Connections |
| Overarching idea | Space and shapes |
| Context | Real life situations |
| Item format | Short response |
| Cognitive process | Interpreting |
| Proficiency level | 3 |

|  |
| --- |
| **7. QUIZ IN QUICK ROUND** |

|  |  |
| --- | --- |
| **Domain** : Mathematical Literacy | **Theme** : Lines and angles |
| Class :VII | Expected time : 5min. |
| Description of item : Image, Text | Learning outcome : Property of parallel lines. |

On the birthday of the great mathematician Srinivasa Ramanuja, a mathematics quiz was organized by Ramanuja Maths foundation in the district level. One round was “QUICK round” and two students were selected from each team, prizes were given to the students who solved the question first. The problem is given in the figure. If AB||CD, calculate the value of x?



**Credit pattern :**

Full credit :02

Partial credit : 01

No credit : 0

**Answers:**

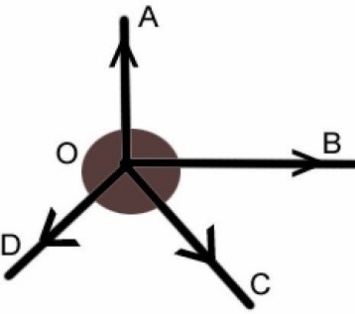
1. 40O: full credit

b) No credit: other responses & missing.

|  |  |
| --- | --- |
| **Framework** | **Characteristics** |
| Competency | Understanding basic concepts |
| Overarching idea | Pair of angles/Two lines cut by another line |
| Context | Scientific |
| Item format | Individual |
| Cognitive process | Problem solving |
| Proficiency level | Level 3 |

**8. SELLING BOOKS**

|  |  |
| --- | --- |
| **Domain** : Mathematical Literacy | **Theme** : Lines and angles |
| Class :VII | Expected time : 5min. |
| Description of item : Image, Text | Learning outcome : Property of parallel lines.Vertically opposite angles |



In figure, O is the BOOK STORE which supplies text books to 4 neighboring Govt. Schools A, B, C and D .The angle made by schools A and B with the store is 900 .The ratio of the angles between Band C, C and D and D and A is 1:2:3. Find theangles?

**Credit pattern :**

Full credit :02

Partial credit : 01

No credit : 0

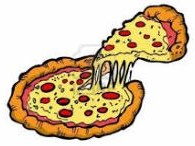
**Answers:**

1. 45 O,90 O,135 O Full credit
2. Partial credit: anycorrect answer(1mark)
3. No credit: other responses & missing.

|  |  |
| --- | --- |
| **Framework** | **Characteristics** |
| Competency | Understanding basic concepts |
| Overarching idea | Pair of angles/Two lines cut by another line |
| Context | Scientific |
| Item format | Individual |
| Cognitive process | Problem solving |
| Proficiency level | Level 3 |

**9. PIZZA**

|  |  |
| --- | --- |
| **Domain** : Mathematical Literacy | **Theme** : Lines and angles |
| Class :VII | Expected time : 5min. |
| Description of item : Image, Text | Learning outcome : Angles around a point |



5 friends bought pizza by contributing their pocket money. They want to divide it equally among themselves. But one of them was given double piece as he was very hungry. Find the angle of the piece of pizza that each one received?

**Credit pattern :**

Full credit :02

Partial credit : 01

No credit : 0

**Answers:**

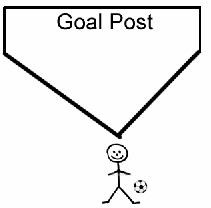
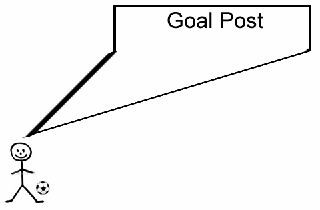
1. 4 friends: 60O,I friend 60x2=120 O. full credit
2. No Credit. Other responses and missing.

|  |  |
| --- | --- |
| Framework | Characteristics |
| Competency | Understanding basic concepts |
| Overarching idea | Angle sum property and pair of angles |
| Context | Scientific |
| Item format | Individual, MCQ |
| Cognitive process | Problem solving |
| Proficiency level | Level 3 |

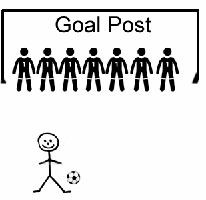
**10. GOAL POST AND GOLI**

|  |  |
| --- | --- |
| **Domain** : Mathematical Literacy | **Theme** : Lines and angles |
| Class :VII | Expected time : 5min. |
| Description of item : Image, Text | Learning outcome : Relation between greatest angle and longest side |

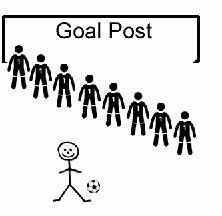
The drawings below show the angles formed by the goal post at different positions of a football player. The greater the angle, the better chance the player has of scoring a goal. For example, the player has a better chance of scoring a goal from position A than from positionB.

****

1. 7 football players are practicing their kicks. They are lined up in a straight line in frontofthegoalpost,whichplayerhasthebest(thegreatest)kickingangle?



(b)Now 8 players are lined up as shown in the figure (ii). Which player(s)has the best kicking?



## ( c) Estimate at least 2 situationssuch that the angle formed by different positions oftwo players are complement to each other

**Credit pattern :**

Full credit :02

Partial credit : 01

No credit : 0

**Answers:**

1. The player no.4 (Since the position is midway between all players)
2. The player No.4 and 5
3. 300,600, 00,900 Full credit
4. Partial credit: each situation(1mark)
5. No credit, other responses & missing.

|  |  |
| --- | --- |
| Frame work | Characteristics |
| Competency | Understanding basic concepts |
| Overarching idea | Relation between greater angle and the longest side |
| Context | Scientific |
| Item Format | Individual MCQ |
| Cognitive process | Problem Solving |
| Proficiency level | Level 3 |

**11. ECO-FRIENDLY HOUSE**

|  |  |
| --- | --- |
| **Domain** : Mathematical Literacy | **Theme** : Lines and angles |
| Class :VII | Expected time : 5min. |
| Description of item : Image, Text | Learning outcome : Angle sum property,vertically opposite angles |

In order to maintain the health and comfort of a human being, body must be capable of cooling down when it is hot, heat up when it is cool and disposal of waste. In order to maintain equilibrium of the system we need energy so is the case with the buildings where we live. All the activities performed by human body are required for a building like breathing means circulation of air in a building, and as well as heating and cooling of the building (either natural or artificial). So, Tanuj constructed an eco-friendly home

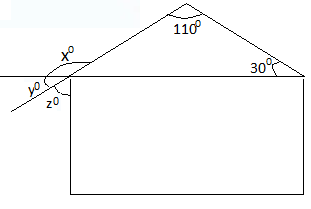


Fig 1 Fig 2

1. How many obtuse angles can you see in Fig 2 ?
2. In Fig. 2 Count the number of right angles
3. While constructing a house angles play an important role. Here in this part of layout find the measure of the angles x, y and z.

**Credit pattern :**

Full credit : 2

Partial credit : 1

No credit :0

**Answers:**

a) 2

b) 5

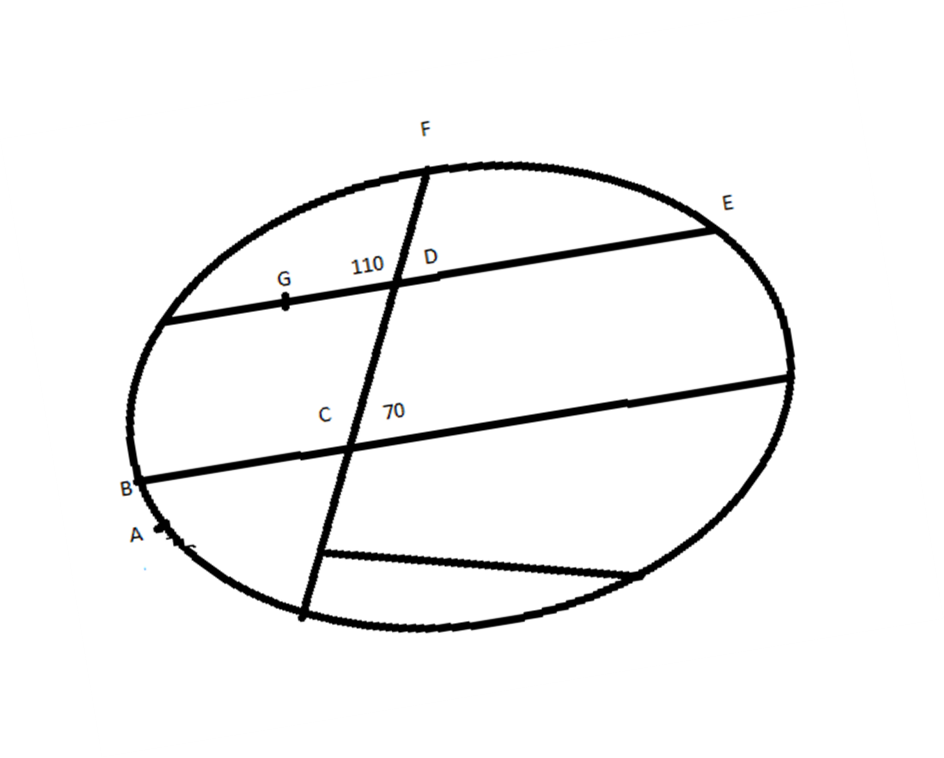
c) x = 140, y = 40 , z = 50

|  |  |
| --- | --- |
| Framework | Characteristics |
| Competency | Understanding basic concepts |
| Overarching idea | Angle sum property and pair of angles |
| Context | Scientific |
| Item format | Individual, MCQ |
| Cognitive process | Problem solving |
| Proficiency level | Level 3 |

**12 WAY TO FRIEND’S HOUSE**

|  |  |
| --- | --- |
| **Domain** : Mathematical Literacy | **Theme** : Lines and angles |
| Class :VII | Expected time : 5min. |
| Description of item : Image, Text | Learning outcome : Properties of parallel lines |

Raju’s father gifted a bicycle on his 15th Birthday. He decided to visit his friend’s house in the city. For this he has to enter the ring road and catch one of the straight roads to reach his destination. He was little bit confused with the route and started the journey anyway.



H

K

8 km

8 km

He entered the ring road at the point A and travelled 1Km to reach the junction at the point B. From there he took a right turn and travel 8Km to reach the junction C. From there he took left turn travelled 3Km to reach the junction D. Instead of taking left turn he again took a right turn and travelled 4 Km to reach the junction E on the ring road again. He realised his mistake. Now he travelled 3Km from the point E to the point F. From the point F he took a left turn travelled 1Km to reachthe junction D again. From there he took a right turn and travelled 3 Km to reach his friend’s house close to the point G on the road.

1. What is the total distance travelled by Raju
2. If he has chosen the shortest route how many Km he would have saved?
3. Are the Roads BC and DE are parallel? Give reasons.
4. Do you think that Raju planned his journey properly. Justify your answer

**Credit pattern :**

Full credit : 2

Partial credit : 1

No credit : 0

**Answers :**

* 1. 23km (full credit)
  2. 6km (full credit)
  3. Yes. Reasons (Angle CDE =110°, angle CDE + angle DCK =180°) Pair of interior angles on the same side of the transversal are supplementary

(full credit)

* 1. No. He would have decided the route of his travel before he started his journey. If he travels from the point B through the ring road up to the point H and take a right turn he would have reached earlier. (full credit)

|  |  |
| --- | --- |
| Framework | Characteristics |
| Competency | Understanding basic concepts |
| Overarching idea | Properties of parallel lines |
| Context | Scientific |
| Item format | Individual, MCQ |
| Cognitive process | Problem solving |
| Proficiency level | Level 3 |

Prepared by: 1 Mr Abraham Mathew, VP KV PATTOM SHIFT II

2. Mrs Mini Shekhar, TGT Maths KV NO1 Palakkad

3. Mrs Anisha N, TGT Maths KV No2 Calicut

4. Mrs Aniqueen A, TGT Maths KV NO1 CPCRI Kasaragod

ERNAKULAM REGION