***KINEMATICS***

***Summary:***

***1.*** *Kinematics deals with speed****,*** *distance and time*

***2.*** *The following terms are computed as follows****:***

***(i) Distance*** *= speed × time* ***(ii)***

***(iii)******(iv)*** 

***3.*** *Time in minutes can be converted into hours and vice versa as follows****:***

***(i) 15 minutes*** 

***(ii) 0⋅25 hours =*** *0⋅25 × 60* ***= 15 minutes***

***4.*** *Speed in*   *can be converted into*  *as follows****:***



***5.*** *If a car travels at a constant speed of*  *it means that the car covers* ***60km*** *after every one hour*

***EXAMPLES:***

***1.*** *A car travels with a constant speed of*  *How far can it travel in* ***21*** *minutes****?***

***Soln:***

***Distance*** *= s × t* 

***2.*** *A car travels* ***75km*** *at a constant speed of*  *How long does the journey take****?***

***Soln:***



***3.*** *A car travels* ***36km*** *in* ***45****minutes****.*** *Find its average speed*

***Soln:***



***4.*** *A car travels for* ***5*** *hours with a constant speed of* *and then travels for* ***3*** *hours with a constant speed of* *Find its average speed*

***Soln:***



*Distance* ***I*** *= 85 × 5 =* ***425km***

*Distance* ***II*** *= 69 × 3 =* ***207km***

***∴*** 

***5.*** *A car travels* ***97⋅5km*** *with a constant speed of* *and then travels* ***60km***  *with a constant speed of* *Find its average speed*

***Soln:***



*Time* ***I*** *Time* ***II***

***∴*** 

***6.*** *A car travels for* ***5*** *hours at an average speed of*  *for the entire journey****.*** *For the first two**hours its steady speed is*  *Find its steady speed for the last three**hours*

***Soln:***



*Distance* ***I*** *= 30 × 2 =* ***60km***

*Distance* ***II*** *= v × 3 =* ***3v***

***⇒*** 

***∴*** 

***7.*** *A man covers a distance of* ***15km*** *in* ***3******hours,*** *partly by walking and partly by*

*running****.*** *If he walks at* *and runs at* *find the distance he*

*covers by running*

***Soln:***

*If* ***x =*** *distance walked****,*** ***y******=*** *distance ran*



***8.*** *Tom arrives early to school by* ***10*** *minutes when he rides from home at a steady speed of*  *When he rides at a steady speed of*  *he arrives late by* ***6*** *minutes****.*** *Calculate****:***

***(i)*** *how far the school is from his home*

***(ii)*** *the speed that enables him to be punctual*

***Soln:***

***(i)*** *let* ***d******=*** *required**distance****,******t =*** *time required to be punctual*

*If difference in time =* 



*Also: If difference in time =* 





***(ii)*** 

***9.*** *A train takes* ***15*** *minutes less for a journey of* ***156km*** *if its speed is increased by* *from its normal speed****.*** *Find its normal speed*

***Soln:***

*let* ***v =*** *required speed If difference in time =* 



**

**



***10.*** *Two cyclists*  *and*  *left town* ***P*** *for town* ***Q, 18km*** *away at the same time****.*** *travelled at a steady speed of* *faster than*  *When*  *had covered half the distance****,*** *he delayed for half an hour****,*** *after which he travelled at a speed* ***20%*** *less his original speed and arrived in town* ***Q 15*** *minutes earlier than*  *Determine the original speeds of the two cyclists*  *and* 

***Soln:***

*let* ***v =*** *speed of cyclist* 





*If difference in time =* 



**

**



***⇒*** *Speed of cyclist*  ***=*** *v + 15 = 12 + 15* ***=***

***EER:***

***1.*** *A car travels for* ***40*** *minutes with a constant speed of* *Find the speed of another car which takes* ***48*** *minutes to travel the same distance*

***[ Ans:***  ***]***

***2.*** *A car travels*  *with a constant speed of* *and then travels for* ***45*** *minutes with a constant speed of* *Find its average speed*

***[ Ans:***  ***]***

***3.*** *Tom walking at* *from home to school takes* ***20*** *minutes less when he returns at*  *Calculate how far the school is from his home*

***[ Ans:***  ***]***

***4.*** *Tom walks to work at* *and returns home at*  *If the entire journey takes him* ***1*** *hour* ***39*** *minutes****,*** *calculate how far the place of work is from his home*

***[ Ans:***  ***]***

***5.*** *A car takes* ***15*** *minutes less for a journey of* ***70km*** *if its speed is increased by* *from its normal speed****.*** *Find its normal speed*

***[ Ans:***  ***]***

***6.*** *A man covers a distance of* ***9⋅5km*** *in* ***2******hours,*** *partly by walking and partly by*

*running****.*** *If he walks at* *and runs at* *find the distance he*

*covers by running*

***[ Ans:***  ***]***

***7.*** *A train takes two hours less for a journey of* ***300km*** *if its speed is increased by* *from its normal speed****.*** *Find its normal speed*

***[ Ans:***  ***]***

***8.*** *Towns* ***P*** *and* ***Q*** *are* ***156km*** *apart****.*** *A car left* ***P*** *for* ***Q*** *at a steady speed of*  *On the return journey****,*** *it increased the speed by*  *and took* ***15*** *minutes less****.*** *Calculate the value of* ***V***

***[ Ans:***  ***]***

***9.*** *It takes* ***3*** *hours to travel between two successive distances at respective speeds of* *and*  *When the speeds are interchanged****,*** *the journey takes* ***8*** *minutes less****.*** *Calculate the distance of the entire journey*

***[ Ans:***  ***]***

***10.*** *Kampala and Jinja are* ***300km*** *apart****.*** *A car moves from Kampala to Jinja and back****.*** *Its average speed on the return journey is* *greater than that on the outward journey and it takes* ***50*** *minutes less****.*** *Find the average speed of the outward journey*

***[ Ans:***  ***]***

***11.*** *Tom arrives early to school by* ***10*** *minutes when he rides from home at a steady speed of*  *When he rides at a steady speed of*  *he arrives late by* ***15*** *minutes****.*** *Calculate****:***

***(i)*** *how far the school is from his home*

***(ii)*** *the speed that enables him to be punctual*

***[ Ans: (i)***  ***(ii)***  ***]***

***12.*** *Two cyclists*  *and*  *left town* ***P*** *for town* ***Q, 24km*** *away at the same time****.*** *travelled at a steady speed of* *faster than*  *When*  *had covered half the distance****,*** *he delayed for three quarters of an hour****,*** *after which he travelled at a speed* ***25%*** *less his original speed and arrived in town* ***Q 15*** *minutes earlier than*  *Determine the original speeds of the two cyclists*  *and* 

***[ Ans: (a)***   ***(b)(i)*** ***16km (ii) 0⋅8h]***

***13.*** *Towns* ***P*** *and* ***Q*** *are* ***130km*** *apart****.*** *At* ***9:00am,*** *a car left* ***P*** *for* ***Q*** *at a speed of*   *and stopped at a petrol station for* ***10*** *minutes****.*** *It resumed its journey at a speed of* *until it reached* ***Q*** *at* ***11:00am.*** *Calculate****:***

***(i)*** *how far the petrol station is from town* ***P***

***(ii)*** *the average speed for the entire journey*

***[ Ans: (i)***  ***(ii)***  ***]***

***14.*** *A motorist travelled 8km up a hill at a steady speed of*  *On the return journey down the hill****,*** *his speed was*  *The difference in time between the uphill and downhill journeys was* ***10*** *minutes****.***

***(a)*** *Write down an expression for the time taken for the****:***

***(i)*** *uphill journey*

***(ii)*** *downhill journey*

***(b)******(i)*** *Form a quadratic equation for the difference in time for the two journeys*

***(ii)*** *Solve the quadratic equation*

***(c)*** *Find his average speed for the uphill and downhill journeys*

***[ Ans: (b)(i)***  ***(ii)***  ***(c)***  ***]***

***MOTION WITH CATCH UP OR MEETING***

***Summary:***

*In case of two bodies catching up or meeting during motion****:***

***(i)*** ***“****Motion is in the same direction****”***

***(ii)***  ***“****Motion is in opposite direction****”***

***(iii)*** *Relative speed is the same as speed difference*

***(iv)*** *Relative distance is the same as distance apart at the start of timing*

***(v)*** *Timing in this case starts with the latter rather than the former*

***EXAMPLES:***

***1.*** *A car is moving at* *and a bus* ***30km*** *behind it is moving in the same direction at*  *Calculate the****:***

***(i)*** *time taken by the bus to catch up with the car*

***(ii)*** *distance travelled by the bus to catch up with the car*

***Soln:***

***•***

***•***

***•***

***Car***

***Bus***

***Catch up point***

***30km***

***(i)*** 

***(ii)*** *Distance to catch up* ***=*** *s × t* ***=*** *60 × 1⋅5 =* ***90km***

***Or*** *Distance to catch up* ***=*** *30 + (40 × 1⋅5) =* ***90km***

***METHOD 2***

***(i)*** *Let* ***t =*** *time taken by the bus to catch up*

***•***

***•***

***•***

***Car***

***Bus***

***Catch up point***

***30km***

***40t***

***60t***

*Bus’s total distance* ***=*** *car’s total distance*

*60t = 30 + 40t*

***∴ t =******1⋅5h***

***(ii)*** *Distance to catch up* ***=*** *s × t* ***=*** *60 × 1⋅5 =* ***90km***

***Or*** *Distance to catch up* ***=*** *30 + (40 × 1⋅5) =* ***90km***

***2.*** *Tom left home riding steadily at*  *Two hours later Bob left the same home riding steadily along the same road at*  *Calculate****:***

***(i)*** *how long will it take Bob to catch up with Tom*

***(ii)*** *how far will Bob travel to catch up with Tom*

***Soln:***

***•***

***•***

***•***

***Tom***

***Bob***

***Catch up point***

***14km***

***(i)*** *Tom’s distance in* ***2h =*** *7 × 2 =* ***14km***



***(ii)*** *Distance to catch up* ***=*** *s × t* ***=*** *15 × 1⋅75 =* ***26⋅25km***

***Or*** *Distance to catch up* ***=*** *14 + (7 × 1⋅75) =* ***26⋅25km***

***METHOD 2***

***(i)*** *Let* ***t =*** *time taken by the Bob to catch up*

***•***

***•***

***•***

***Tom***

***Bob***

***Catch up point***

***14km***

***7t***

***15t***

*Bob’s total distance* ***=*** *Tom’s total distance*

*15t = (7 × 2) + 7t*

***∴ t =******1⋅75h***

***(ii)*** *Distance to catch up* ***=*** *s × t* ***=*** *15 × 1⋅75 =* ***26⋅25km***

***Or*** *Distance to catch up* ***=*** *14 + (7 × 1⋅75) =* ***26⋅25km***

***3.*** *Bob and Tom have to go to church* ***12⋅5km*** *away from their home****.*** *When Bob had covered* ***3⋅2km,*** *riding steadily at*  *Tom left the same home riding steadily along the same road at* 

***(a)*** *Calculate****:***

***(i)*** *how long will it take Tom to catch up with Bob*

***(ii)*** *how far will Tom travel to catch up with Bob*

***(b)*** *Immediately Tom caught up with Bob****,*** *he then reduced his speed and arrived* ***0⋅35*** *hours later than if he had maintained the*  *speed.*

***(i)*** *Calculate by how much he reduced his speed*

***(ii)*** *For how long was he in church before Bob joined him*

***Soln:***

***Church***

***•***

***•***

***•***

***Bob***

***Tom***

***3⋅2km***

***Catch up point***

***•***

***12⋅5km***

***(a)***

***(i)*** 

***(ii)*** *Distance to catch up* ***=*** *s × t* ***=*** *5 × 1⋅6 =* ***8km***

***(b)*** *let* ***v =*** *new speed Remaining distance = 12⋅5 − 8 =* ***4⋅5km***

*If difference in time = 0⋅35*





*⇒ Reduction in speed* 

***(ii)*** *Waiting time =* 

***4.*** *Towns* ***P*** *and* ***Q*** *are* ***500km*** *apart****.*** *A car left* ***P*** *for* ***Q*** *at an average speed of*  *After* *a bus left* ***P*** *left for* ***Q*** *and travelled along the same road at an average speed of* 

***(a)*** *Calculate the****:***

***(i)*** *distance of the car from* ***Q*** *when the bus took off*

***(ii)*** *distance from* ***P*** *to where the bus caught up with the car*

***(b)*** *Immediately the bus caught up with the car****,*** *the bus stopped for* ***25*** *minutes****.*** *Find the new average speed at which the bus travelled in order to reach* ***Q*** *at the same time as the car*

***Soln:***

***•***

***•***

***•***

***Car***

***Bus***

***Catch up point***

***•***

***500km***

***Q***

***P***

***(a)***

***(i)*** *Car’s distance in* ***=*** *60 × 2⋅5 =* ***150km***

***∴*** *Distance from* ***Q =*** *500 − 150* ***= 350km***

***(ii)*** 

***∴*** *Distance to catch up* ***=*** *s × t* ***=*** *100 × 3⋅75 =* ***375km***

***(b)*** *let* ***v =*** *new speed Remaining distance = 500 − 375 =* ***125km***

*If the total time to reach is the same*





***5.*** *A car and a bus left town* ***P*** *for town* ***Q******240km*** *away at* ***8:00 am*** *traveling at*  *and*  *respectively****.*** *After* ***20*** *minutes the bus stopped for* ***30*** *minutes and then resumed its journey at the same speed****.***

***(a)*** *Calculate the****:***

***(i)*** *time when the bus caught up with the car*

***(ii)*** *distance from* ***P*** *to where the bus caught up with the car*

***(iii)*** *time of arrival of the car to town* ***Q***

***Soln:***

***•***

***•***

***•***

***Car***

***Bus***

***Catch up point***

***•***

***500km***

***Q***

***P***

***(a)***

***(i)*** *Bus’s**distance in* ***20*** *minutes* ***=***  *=* ***40km***

*Car’s**distance in* ***50*** *minutes* ***=***  *=* ***75km***



***⇒*** *Required time = 8:50 + 1h 10 minutes* ***= 10:00 am***

***(ii)*** *Distance from* ***P =*** *40 +* ***= 180km***

***(iii)*** *Car’s travel time* 

***⇒*** *Arrival time = 8:00 + 2h 40 minutes* ***= 10:40 am***

***6.*** *Towns* ***P*** *and* ***Q*** *are* ***168km*** *apart****.*** *A car left* ***P*** *for* ***Q*** *at an average speed of*  *At the same time a bus left* ***Q*** *for* ***P*** *at an average speed of* 

***(i)*** *After how long will the two vehicles meet****?***

***(ii)*** *How far is the meeting point from town* ***P?***

***(iii)*** *Just as they met****,*** *the car increased its speed by*   *Find the difference in the times of arrival of the two vehicles*

***Soln:***

***P***

***168km***

***Meeting point***

***Car***

***Q***

***•***

***•***

***•***

***Bus***

***(i)*** 

***(ii)*** *Distance from* ***P =*** *s × t* ***=*** *60 × 1⋅2 =* ***72km***

***(iii)*** *Bus’s distance to* ***P*** *=* ***72km***

***∴*** *Bus’s time to* ***P***

*Car’s distance to* ***Q =*** *168 − 72* ***= 96km*** *New speed =* 

***∴*** *Car’s time to* ***Q***

***⇒*** *Arrival time difference* ***=*** *1⋅25 − 0⋅9* ***= 0⋅35h***

***METHOD 2***

***(i)*** *Let* ***t =*** *time taken by the Bus to meet*

***60t***

***P***

***168km***

***Meeting point***

***Car***

***Q***

***•***

***•***

***•***

***Bus***

***80t***

*If the sum of their distances = 168*

*⇒ 60t + 80t = 168*

***∴ t =******1⋅2h***

***(ii)*** *Distance from* ***P =*** *s × t* ***=*** *60 × 1⋅2 =* ***72km***

***17.*** *Bob and Tom live* ***62km*** *apart****.*** *At* ***7:00 am,*** *Bob left his home cycling towards Tom’s home at* *At* ***7:21 am,*** *Tom left his home cycling towards Bob’s home at*

***(a)*** *Calculate the****:***

***(i)*** *time when the two men met*

***(ii)*** *distance from Bob’s house to where the two men met*

***(b)*** *The two took* ***12*** *minutes at the meeting point and then travelled to Tom’s house at an average speed of*  *Find the time they arrived at Tom’s house*

***Soln:***

***(a) (i)***

***55km***

***Meeting point***

***Bob***

***•***

***•***

***•***

***Tom***

***P***

***•***

***7km***

*Bob’s distance in* ***21*** *minutes* ***=***  *=* ***7km***

***∴***

***⇒*** *Required time = 7:21 + 1h 15 minutes* ***= 8:36 am***

***(ii)*** *Distance from**Bob’s house*  ***=*** *7 + (20 × 1⋅25 )* ***= 32km***

***(b)*** *Distance to Tom’s house* ***=*** *62 − 32* ***= 30km***

***∴*** *Their time to Tom’s house* 

***⇒*** *Arrival time = 8:36 + 12 + 1h 30 minutes* ***= 10:18 am***

***METHOD 2***

***(i)*** *Let* ***t =*** *time taken by Tom to meet*

***62km***

***24t***

***20t***

***P***

***•***

***7km***

***Meeting point***

***Bob***

***•***

***•***

***•***

***Tom***

*Bob’s distance in* ***21*** *minutes* ***=***  *=* ***7km***

*If the sum of their distances = 62*

*⇒ ( 7 + 20t )+ 24t = 62*

***∴ t =******1⋅25h = 1h 15 minutes***

***⇒*** *Required time = 7:21 + 1h 15 minutes* ***= 8:36 am***

***(ii)*** *Distance from**Bob’s house*  ***=*** *7 + (20 × 1⋅25 )* ***= 32km***

***EER:***

***1.*** *Bob and Tom have to go to school* ***9km*** *away from their home****.*** *When Bob had covered* ***3⋅6km,*** *walking steadily at*  *Tom left the same home running steadily along the same road at* 

***(a)*** *Calculate****:***

***(i)*** *how long will it take Tom to catch up with Bob*

***(ii)*** *how far will Tom travel to catch up with Bob*

***(iii)*** *how long was Tom at school before Bob joined him*

***[ Ans: (a)(i) 1⋅5h (ii) 6km (iii) 0⋅45h]***

***2.*** *Bob and Tom live* ***62km*** *apart****.*** *At* ***7:00 am,*** *Bob left his home cycling towards Tom’s home at* *At* ***8:00 am,*** *Tom left his home cycling towards Bob’s home at*

***(a)*** *Calculate the****:***

***(i)*** *time when the two men met*

***(ii)*** *distance from Bob’s house to where the two men met*

***[ Ans: (a)(i) 9:30am (ii) 50km ]***

***3.*** *Towns* ***P*** *and* ***Q*** *are* ***100km*** *apart****.*** *At* ***4:00 am*** *a cyclist left* ***P*** *for* ***Q*** *at a steady speed of*  *At* ***7:30 am,*** *a motorist left* ***P*** *for* ***Q*** *along the same road at a steady speed of* 

***(a)*** *Calculate the****:***

***(i)*** *time when the motorist overtook the cyclist*

***(ii)*** *distance from* ***P*** *to where the motorist overtook the cyclist*

***(iii)*** *time of arrival of the cyclist*

***[ Ans: (a)(i) 8:22 am (ii) 87⋅5km (iii) 9:00 am ]***

***4.*** *Towns* ***P*** *and* ***Q*** *are* ***170km*** *apart****.*** *At* ***8:25am*** *car left* ***P*** *for* ***Q*** *at an average speed of*  *At* ***8:55am*** *bus left* ***Q*** *for* ***P*** *and travelled along the same road at an average speed of* 

***(a)*** *Calculate the****:***

***(i)*** *time when the two vehicles met*

***(ii)*** *distance from* ***P*** *to where the two vehicles met*

***(b)*** *Just as they met****,*** *the car increased its speed by*   *Find the difference in their times of arrival at their destinations*

***[ Ans: (a)(i) 10:10am (ii) 70km (b) 1⋅125h]***

***5.*** *Bob and Tom have to go to church* ***30⋅8km*** *away from their home****.*** *When Bob had covered* ***9km,*** *riding steadily at*  *Tom left the same home riding steadily along the same road at* 

***(a)*** *Calculate****:***

***(i)*** *how long will it take Tom to catch up with Bob*

***(ii)*** *how far will Tom travel to catch up with Bob*

***(b)*** *Immediately Tom caught up with Bob****,*** *he then reduced his speed and arrived* ***0⋅6*** *hours later than if he had maintained the*  *speed.*

***(i)*** *Calculate by how much he reduced his speed*

***(ii)*** *For how long was he in church before Bob joined him*

***[ Ans: (a)(i) 3h (ii) 21km (b)(i)***  ***(ii) 0⋅45h]***

***6.*** *Bob and Tom have to go for a burial* ***138km*** *away from their home****.*** *When Bob had covered* ***18km,*** *riding steadily at*  *Tom left the same home riding steadily along the same road at* 

***(a)*** *Calculate****:***

***(i)*** *how long will it take Tom to catch up with Bob*

***(ii)*** *how far will Tom travel to catch up with Bob*

***(iii)*** *how long Tom will take waiting for Bob at the burial*

***(b)*** *If Bob increased his speed immediately he was overtaken such that they both arrive at the burial at the same time****,*** *calculate by how much he increased his speed*

***[ Ans: (a)(i) 3h (ii) 90km (b)(i)***  ***(ii) 0⋅45h]***

***7.*** *Bob and Tom live* ***190km*** *apart****.*** *At* ***7:00 am,*** *Bob left his home cycling towards Tom’s home at* *At* ***7:30 am,*** *Tom left his home cycling towards Bob’s home at*

***(a)*** *Calculate the****:***

***(i)*** *time when the two men met*

***(ii)*** *distance from Bob’s house to where the two men met*

***(b)*** *The two took* ***15*** *minutes at the meeting point and then travelled to Tom’s house at an average speed of*  *Find the time they arrived at Tom’s house*

***[ Ans: (a)(i) 10:00am (ii) 90km (b) 3:15pm ]***

***8.*** *Two cyclists*  *and*  *left town* ***P*** *for town* ***Q, 24km*** *away at the same time****.*** *travelled at a steady speed of* *faster than*  *When*  *had covered half the distance****,*** *he delayed for three quarters of an hour****,*** *after which he travelled at a speed* ***25%*** *less his original speed and arrived in town* ***Q 15*** *minutes earlier than* 

***(a)*** *Determine the original speeds of the two cyclists*  *and* 

***(b)*** *If cyclist*  *started from town* ***P*** *while*  *at the same time started from town* ***Q*** *and both travelled non−stop****,***

***(i)*** *find how far from* ***P*** *the two cyclists will meet*

***(ii)*** *After how long will they meet****?***

***[ Ans: (a)***   ***(b)(i)*** ***16km (ii) 0⋅8h]***

***DISTANCE−TIME GRAPHS***

***EXAMPLES:***

***1.*** *Towns* ***P*** *and* ***Q*** *are* ***500km*** *apart****.*** *At* ***8:15 am*** *a car left* ***P*** *for* ***Q*** *traveling at a steady speed of*  *Two and a half hours later****,*** *a bus left* ***P*** *for* ***Q*** *along the same road at a steady speed of* 

***(a)*** *On the same axes show the journeys of the two vehicles*

***[****Use a scale of* ***2cm*** *to represent* ***50km*** *and* ***2cm*** *to represent* ***1*** *hour* ***]***

***(b)*** *Use your graphs to find the****:***

***(i)*** *distance of the car from* ***Q*** *when the bus took off*

***(ii)*** *time and distance from* ***P*** *where the bus overtook the car*

***(iii)*** *difference in the times of arrival of the two vehicles*

***Soln:***

***Table for the car (P*** *to* ***Q)***

|  |  |  |  |
| --- | --- | --- | --- |
| *Distance moved* | ***0*** | ***60*** | ***120*** |
| *Time of the day* | ***8:15*** | ***9:15*** | ***10:15*** |

***Table for the bus (P*** *to* ***Q)***

|  |  |  |  |
| --- | --- | --- | --- |
| *Distance moved* | ***0*** | ***100*** | ***200*** |
| *Time of the day* | ***10:45*** | ***11:45*** | ***12:45*** |

***2.*** *Towns* ***P*** *and* ***Q*** *are* ***360km*** *apart****.*** *At* ***7:30 am*** *a car left* ***P*** *for* ***Q*** *traveling at a steady speed of*  *At the same time a bus left* ***Q*** *for* ***P*** *at an average speed of* 

***(a)*** *On the same axes show the journeys of the two vehicles*

***[****Use a scale of* ***2cm*** *to represent* ***50km*** *and* ***2cm*** *to represent* ***1*** *hour* ***]***

***(b)*** *Use your graphs to find the****:***

***(i)*** *time when the two vehicles met*

***(ii)*** *distance from* ***Q*** *to where the two vehicles met*

***(iii)*** *difference in the times of arrival of the two vehicles*

***Soln:***

***Table for the car (P*** *to* ***Q)***

|  |  |  |  |
| --- | --- | --- | --- |
| *Distance moved* | ***0*** | ***80*** | ***160*** |
| *Time of the day* | ***7:30*** | ***8:30*** | ***9:30*** |

***Table for the bus (Q*** *to* ***P)***

|  |  |  |  |
| --- | --- | --- | --- |
| *Distance moved* | ***0*** | ***100*** | ***200*** |
| *Time of the day* | ***7:30*** | ***8:30*** | ***9:30*** |

***3.*** *Towns* ***P*** *and* ***Q*** *are* ***180km*** *apart****.*** *At* ***0730*** *hours a car left* ***P*** *for* ***Q*** *traveling at a steady speed of*  *After* ***2*** *hours the car stopped for*  *and**then proceeded with its journey at a speed of* *A bus left* ***Q*** *for* ***P*** *at the same time as the car at a steady speed of* *but suddenly reduced its speed after* ***2*** *hours to*  *for the rest of its journey*

***(a)*** *On the same axes show the journeys of the two vehicles*

***[****Use a scale of* ***2cm*** *to represent* ***20km*** *and* ***2cm*** *to represent* ***1*** *hour* ***]***

***(b)*** *Use your graphs to find the****:***

***(i)*** *time and distance from* ***Q*** *where the two vehicles met*

***(ii)*** *distance between the two vehicles at* ***0930*** *hours*

***(iii)*** *times of arrival of the two vehicles at their destinations*

***(iv)*** *difference in the times of arrival at the respective towns*

***Soln:***

***Table for the car (P*** *to* ***Q)***

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| *Distance moved* | ***0*** | ***40*** | ***80*** | ***80*** | ***130*** | ***180*** |
| *Time of the day* | ***0730*** | ***0830*** | ***0930*** | ***1100*** | ***1200*** | ***1300*** |

***Table for the bus (Q*** *to* ***P)***

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| *Distance moved* | ***0*** | ***60*** | ***120*** | ***135*** | ***150*** | ***165*** |
| *Time of the day* | ***0730*** | ***0830*** | ***0930*** | ***1030*** | ***1130*** | ***1230*** |

***4.*** *Towns* ***P*** *and* ***Q*** *are* ***150km*** *apart****.*** *At* ***1100*** *hours a car left* ***P*** *for* ***Q*** *traveling at a steady speed of*  *After half an hour a bus left* ***P*** *for* ***Q*** *at a steady speed of*  *but after traveling* ***30km,*** *it stopped for* ***15*** *minutes and**then resumed its journey at a speed of*  *The bus arrived at* ***Q*** *and rested for* ***30*** *minutes before returning to* ***P*** *by the same road where it arrived at* ***1442*** *hours*

***(a)*** *On the same axes show the journeys of the two vehicles*

***[****Use a scale of* ***2cm*** *to represent* ***25km*** *and* ***4cm*** *to represent* ***1*** *hour* ***]***

***(b)*** *Use your graphs to find the****:***

***(i)*** *time and distance from* ***Q*** *where the bus overtook the car on its way to* ***Q***

***(ii)*** *time and distance from* ***Q*** *where the bus met the car on its way back to* ***P***

***(iii)*** *average speed of the bus for the outward journey*

***(iv)*** *average speed of the bus for the return journey*

***(v)*** *average speed of the bus for the entire journey*

***Soln:***

***Table for the car (P*** *to* ***Q)***

|  |  |  |  |
| --- | --- | --- | --- |
| *Distance moved* | ***0*** | ***50*** | ***100*** |
| *Time of the day* | ***1100*** | ***1200*** | ***1300*** |

***Table for the bus (P*** *to* ***Q*** *and back****)***

|  |  |  |  |  |  |  |
| --- | --- | --- | --- | --- | --- | --- |
| *Distance moved* | ***0*** | ***30*** | ***30*** | ***150*** | ***150*** | ***0*** |
| *Time of the day* | ***1130*** | ***1145*** | ***1200*** | ***1300*** | ***1330*** | ***1442*** |



***EER:***

***1.*** *Towns* ***P*** *and* ***Q*** *are* ***360km*** *apart****.*** *At* ***8:15 am*** *a car left* ***P*** *for* ***Q*** *traveling at a steady speed of*  *After*  *a bus left* ***P*** *for* ***Q*** *along the same road at a steady speed of* 

***(a)*** *On the same axes show the journeys of the two vehicles*

***[****Use a scale of* ***2cm*** *to represent* ***50km*** *and* ***2cm*** *to represent* ***1*** *hour* ***]***

***(b)*** *Use your graphs to find the****:***

***(i)*** *distance of the car from* ***Q*** *when the bus took off*

***(ii)*** *time and distance from* ***P*** *to where the bus overtook the car*

***(iii)*** *difference in the times of arrival of the two vehicles*

***2.*** *Towns* ***P*** *and* ***Q*** *are* ***100km*** *apart****.*** *At* ***5:00am,*** *a car left* ***P*** *and travelled for one hour at a speed of*   *It then increased its speed to* *until it reached* ***Q.*** *At* ***5:30am,*** *a bus left* ***Q*** *for* ***P*** *and travelled at a steady speed of*  *until it broke down* *later****.***

***(a)*** *On the same axes show the journeys of the two vehicles*

***[****Use a scale of* ***2cm*** *to represent* ***10km*** *and* ***2cm*** *to represent* ***30*** *minutes* ***]***

***(b)*** *Use your graphs to find the****:***

***(i)*** *time and distance from* ***P*** *when the two vehicles met*

***(ii)*** *distance from* ***Q*** *to where the bus broke down*

***(iii)*** *time the car reached town* ***Q***

***3.*** *Towns* ***P*** *and* ***Q*** *are* ***200km*** *apart****.*** *At noon****,*** *a car left* ***P*** *and travelled for one hour at a speed of*   *It stopped for* ***30*** *minutes then continued to* ***Q*** *at a speed of*  *At* ***12:30pm,*** *a bus left* ***Q*** *and travelled for one hour at a speed of*   *It then changed and travelled at a speed of* *and arrived at* ***4:30pm*** *at town* ***P***

***(a)*** *On the same axes show the journeys of the two vehicles*

***[****Use a scale of* ***2cm*** *to represent* ***20km*** *and* ***4cm*** *to represent* ***1*** *hour* ***]***

***(b)*** *Use your graphs to find the****:***

***(i)*** *time when the two vehicles met*

***(ii)*** *distance from* ***P*** *to where the two vehicles met*

***(iii)*** *time of arrival of the car*

***(iv)*** *speed* ***V*** *of the bus*

***4.*** *Towns* ***P*** *and* ***Q*** *are* ***360km*** *apart****.*** *At* ***7:00am,*** *a car left* ***P*** *and travelled for two hours at a speed of*   *It stopped for* ***1*** *hour then continued to* ***Q*** *at a steady speed for* ***4*** *hours****.***  *At* ***8:00am,*** *a bus left* ***Q*** *for* ***P*** *and travelled non−stop for* 

***(a)*** *On the same axes show the journeys of the two vehicles*

***[****Use a scale of* ***2cm*** *to represent* ***40km*** *and* ***2cm*** *to represent* ***1*** *hour* ***]***

***(b)*** *Use your graphs to find the****:***

***(i)*** *time when the two vehicles met*

***(ii)*** *distance from* ***P*** *when the two vehicles met*

***(iii)*** *average speed of the bus*

***5.*** *Towns* ***P*** *and* ***Q*** *are* ***45km*** *apart****.*** *At* ***0815*** *hours****,*** *Bob left* ***P*** *for* ***Q*** *riding at a speed of*   *His bicycle broke down at* ***0915*** *hours and was delayed for* ***45*** *minutes****.*** *He then walked back to* ***P*** *and arrived at* ***1230*** *hours****.*** *At* ***0915*** *hours**Tom left* ***P*** *for* ***Q*** *riding at a steady speed and arrived at* ***1200*** *hours****.***

***(a)*** *On the same axes show the journeys of the two men*

***[****Use a scale of* ***2cm*** *to represent* ***20km*** *and* ***4cm*** *to represent* ***1*** *hour* ***]***

***(b)*** *Use your graphs to find the****:***

***(i)*** *distance from* ***P*** *when Bob’s bicycle broke down*

***(ii)*** *speed at which Bob walked back to* ***P***

***(iii)*** *average speed of Tom*

***(iv)*** *time when the two men met*

***(iv)*** *distance from* ***P*** *when the two men met*

***6.*** *Towns* ***P*** *and* ***Q*** *are* ***90km*** *apart****.*** *At* ***7:00 am,*** *a car left* ***P*** *for* ***Q*** *traveling at a steady speed of*  ***45*** *minutes later****,*** *a bus left* ***P*** *for* ***Q*** *at a steady speed of*  *but after traveling* ***15km,*** *it stopped for half an hour and**then resumed its journey at a speed of*  *The bus arrived at* ***Q*** *and rested for* ***15*** *minutes before returning to* ***P*** *by the same road where it arrived at* ***11:15 am.***

***(a)*** *On the same axes show the journeys of the two vehicles*

***[****Use a scale of* ***2cm*** *to represent* ***10km*** *and* ***4cm*** *to represent* ***1*** *hour* ***]***

***(b)*** *Use your graphs to find the****:***

***(i)*** *time and distance from* ***P*** *where the bus overtook the car on its way to* ***Q***

***(ii)*** *time and distance from* ***Q*** *where the bus met the car on its way back to* ***P***

***(iii)*** *average speed of the bus for the return journey*

***7.*** *Towns* ***P*** *and* ***Q*** *are* ***450km*** *apart. At* ***7:42am,*** *a Van and a Bus left* ***P*** *for* ***Q*** *travelling at*  *and* *respectively****.*** *After* ***30*** *minutes****,*** *the bus had a puncture which took* ***1⋅8*** *hours**to mend before resuming the journey at the same speed.*

***(a)*** *On the same axes show the journeys of the two vehicles*

***[****Use a scale of* ***2cm*** *to represent* ***50km*** *and* ***2cm*** *to represent* ***1*** *hour* ***]***

***(b)*** *Use your graph****,*** *to find the****:***

***(i)*** *distance from* ***P*** *to where the two vehicles met for the first time****.***

***(ii)*** *time and distance from* ***Q*** *to where the two vehicles met for the second time*

***(iii)*** *difference in the times of arrival of the two vehicles*

***(iv)*** *average speed of the bus for the entire journey*

***8.*** *Town* ***P*** *is* ***300km*** *from town* ***Q.*** *A lorry left town* ***P*** *for* ***Q*** *at* ***7:30am*** *and*

*travelled at a steady speed of*  *At the same time****,*** *a bus left town* ***Q***

*for town P and travelled at a steady speed of* 

***(a)*** *On the same axes show the journeys of the two vehicles*

***[****Use a scale of* ***2cm*** *to represent* ***50km*** *and* ***2cm*** *to represent* ***1*** *hour* ***]***

***(b)*** *Use your graph****,*** *to find the time and distance from* ***Q*** *to where the two vehicles met*

***(c)*** *Just as they met****,*** *the lorry and the bus were then driven at speeds of*  *and*  *respectively****,*** *calculate the difference in their times of*

*arrival at their destinations****.***