Preparation for
High School Mathematics
Measurement
(Speed, Distance, Time)

Solutions

Instructions and Tips:
✓ You have 60 minutes to complete this worksheet
✓ This worksheet consists of 5 questions
✓ Write answers in the spaces provided
✓ All working must be clearly shown
✓ Give answers to 2 decimal places

Student Name: _______________________________
Student ID: __________________________________
Date: _ _ / _ _ / _ _ _ _

Total Score:

Highest Score:

Tutor's Comments:

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**Question 1**

A sprinter from St. Kitts and Nevis enters a regional 100 m race. The sprinter covers a distance of 100 m in 9.87 seconds.

(a) Calculate his average speed for the race.

Average speed = \( \frac{Total \ Distance}{Total \ Time} \) = \( \frac{100 \ m}{9.87 \ s} \)

Average speed = \( 10.13 \ m/s \) (to 2 decimal places)  

(b) What should his average speed be to complete the 100 m in 9.59 seconds?

Average speed required = \( \frac{100 \ m}{9.59 \ s} \) = \( 10.43 \ m/s \) (to 2 decimal places)

(c) The sprinter's average speed for a 200 m race is 10.21 m/s. Calculate the time he takes to cover 200 m.

Average speed = \( \frac{Total \ Distance}{Total \ Time} \)

Time \times \ Average \ Speed = Total \ Distance

Time = \( \frac{Total \ Distance}{Average \ Speed} \)

Time = \( \frac{200 \ m}{10.21 \ m/s} \) = \( 19.59 \) seconds (to 2 decimal places)
Question 2

A pickup truck travels at 65 kilometres per hour on a highway in Trinidad.

(a) Calculate the time taken, in minutes, to cover 30 km at this constant speed.

Average speed = \( \frac{Total \ Distance}{Total \ Time} \)  
Time = \( \frac{Total \ Distance}{Average \ Speed} \) = \( \frac{30 \ km}{65 \ km/h} \)

Time = 0.461538462 hour  
1 hour = 60 minutes  
0.461538462 hour = 60 minutes \times 0.461538462 = 27.69 minutes (to 2 dp)

(b) Calculate the time taken, in minutes, to cover 30 km at a constant speed of 80 km/h.

Average speed = \( \frac{Total \ Distance}{Total \ Time} \)  
Time = \( \frac{Total \ Distance}{Average \ Speed} \) = \( \frac{30 \ km}{80 \ km/h} \)

Time = 0.375 hour  
1 hour = 60 minutes  
0.375 hour = 60 minutes \times 0.375 = 22.5 minutes (to 2 dp)

(c) How much time is saved by travelling at 80 km/h instead of 65 km/h over a distance of 30 km?

Time saved = Time taken at 65km/h – Time taken at 80 km/h

Time saved = 27.69 minutes – 22.5 minutes  
Time saved = 5.19 minutes (to 2 dp)
Question 3

The chart below shows the 2 kilometre sprint times of some speed boats in a race off the coast of Trinidad.

<table>
<thead>
<tr>
<th>Name of Speedboat</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Icacos Fire</td>
<td>51 seconds</td>
</tr>
<tr>
<td>Erin Dragon</td>
<td>50 seconds</td>
</tr>
<tr>
<td>St. Patrick Speedster</td>
<td>49 seconds</td>
</tr>
<tr>
<td>Mr. La Brea</td>
<td>45 seconds</td>
</tr>
</tbody>
</table>

(a) Calculate the average speed (in km/h) of Mr. La Brea during the sprint.

Average speed = \( \frac{\text{Total Distance}}{\text{Total Time}} \) = \( \frac{2 \text{ km}}{45 \text{ seconds}} \) = \( \frac{2 \text{ km}}{\frac{45}{3600} \text{ hours}} \)

\( 45 \text{ seconds} = \frac{1}{3600} \text{ hour} \)

\( \text{Total Time (Mr. La Brea)} = 0.0125 \text{ hour} \)

\( \text{Average speed} = \frac{2 \text{ km}}{0.0125 \text{ hour}} = 160 \text{ km/h} \)  

(b) Calculate the average speed (in km/h) of Icacos Fire during the sprint.

Average speed = \( \frac{\text{Total Distance}}{\text{Total Time}} \) = \( \frac{2 \text{ km}}{51 \text{ seconds}} \) = \( \frac{2 \text{ km}}{\frac{51}{3600} \text{ hours}} \)

\( 51 \text{ seconds} = \frac{1}{3600} \text{ hour} \)

\( \text{Total Time (Icacos Fire)} = 0.014166667 \text{ hour} \)

\( \text{Average speed} = \frac{2 \text{ km}}{0.014166667 \text{ hour}} = 141.18 \text{ km/h (to 2 dp)} \)  

(c) The crew of Mr. La Brea want to achieve a time of 43 seconds in the next race. What should their average speed in km/h be?

Average speed = \( \frac{\text{Total Distance}}{\text{Total Time}} \) = \( \frac{2 \text{ km}}{43 \text{ seconds}} \) = \( \frac{2 \text{ km}}{\frac{43}{3600} \text{ hours}} \)

\( 43 \text{ seconds} = \frac{1}{3600} \text{ hour} \)

\( \text{Required Time (Mr. La Brea)} = 0.011944444 \text{ hour} \)

\( \text{Average speed} = \frac{2 \text{ km}}{0.011944444 \text{ hour}} = 167.44 \text{ km/h (to 2 dp)} \)  

(3 marks)
Question 4

The table below indicates the times recorded by five horses at a horse racing event, on the beach, in Cedros, Trinidad. The race distance is 1.5 km.

<table>
<thead>
<tr>
<th>Name of Horse</th>
<th>Time</th>
</tr>
</thead>
<tbody>
<tr>
<td>Palo Seco Spirit</td>
<td>72 seconds</td>
</tr>
<tr>
<td>Apache</td>
<td>73 seconds</td>
</tr>
<tr>
<td>Survivor</td>
<td>74 seconds</td>
</tr>
<tr>
<td>Coromandel Commander</td>
<td>68 seconds</td>
</tr>
</tbody>
</table>

(a) Calculate the average speed (in m/s) of each horse.

Average speed = \( \frac{\text{Total Distance}}{\text{Total Time}} \)  
1 km = 1000 m  
1.5 km = 1000 m \times 1.5  
1.5 km = 1500 m

Average Speed (Palo Seco Spirit) = \( \frac{1500 \text{ m}}{72 \text{ seconds}} \) = 20.83 m/s (to 2 dp)

Average Speed (Apache) = \( \frac{1500 \text{ m}}{73 \text{ seconds}} \) = 20.55 m/s (to 2 dp)

Average Speed (Survivor) = \( \frac{1500 \text{ m}}{74 \text{ seconds}} \) = 20.27 m/s (to 2 dp)

Average Speed (Coromandel Commander) = \( \frac{1500 \text{ m}}{68 \text{ seconds}} \) = 22.06 m/s (to 2 dp)

(b) Complete the table below to show the position of each horse in the race.

<table>
<thead>
<tr>
<th>Place</th>
<th>Name of Horse</th>
</tr>
</thead>
<tbody>
<tr>
<td>1st</td>
<td>Coromandel Commander</td>
</tr>
<tr>
<td>2nd</td>
<td>Palo Seco Spirit</td>
</tr>
<tr>
<td>3rd</td>
<td>Apache</td>
</tr>
<tr>
<td>4th</td>
<td>Survivor</td>
</tr>
</tbody>
</table>

(2 marks)
Question 5

A ferry leaves Port of Spain with passengers headed for a family day at Columbus Bay. The distance to be covered is 80 km.

(a) Calculate the average speed (in km/h) the ferry has to travel to arrive in 1 hour and 15 minutes.

Average speed = \( \frac{\text{Total Distance}}{\text{Total Time}} \)

1 hour and 15 minutes = 1.25 hours

Average speed = \( \frac{80 \text{ km}}{1.25} = 64 \text{ km/h} \)

(2 marks)

(b) The ferry leaves Port of Spain at 6am but arrives at its destination at 7:30 am. Calculate the average speed of the ferry in this case.

Average speed = \( \frac{\text{Total Distance}}{\text{Total Time}} \)

Time taken = 1 hour and 30 minutes = 1.5 hours

Average speed = \( \frac{80 \text{ km}}{1.5 \text{ hour}} = 53.33 \text{ km/h (to 2 dp)} \)

(2 marks)