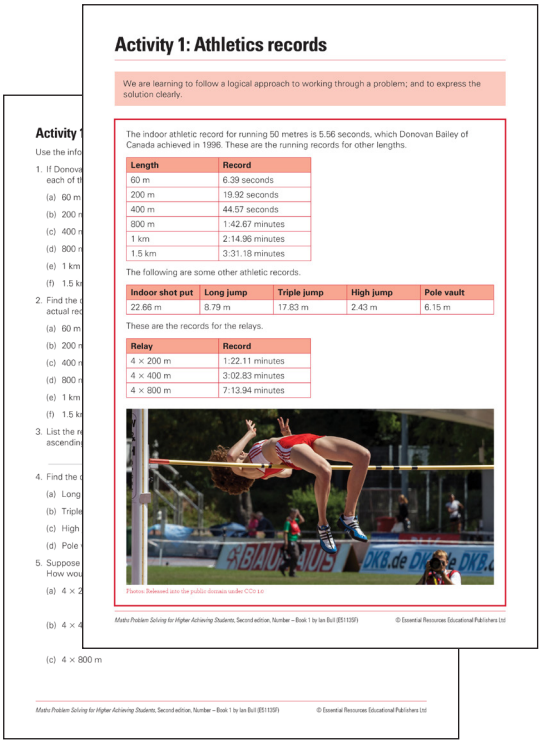
General word problems

Teacher notes

The following notes present hints you can use for yourself as a quick and easy way to become acquainted with the activity without having to work through the whole sheet. You can also either copy the hints or deliver them verbally to get students back on track with the activity if needed.

Activity 1: Athletics records

1. Several ways to approach this are possible. Find the time taken for Donovan to run 10 metres and scale up the time for each distance.
2. Subtract the records from the answers in question 1.
3. Ascending order is from smallest to biggest.
4. Subtract the distances from the shot put record.
5. Use the total length of the relay to work out the time if every 50 m can be run in 5.56 seconds.



Activity 1: Athletics records

We are learning to follow a logical approach to working through a problem; and to express the solution clearly.

The indoor athletic record for running 50 metres is 5.56 seconds, which Donovan Bailey of Canada achieved in 1996. These are the running records for other lengths.

Length	Record
60 m	6.39 seconds
200 m	19.92 seconds
400 m	44.57 seconds
800 m	1:42.67 minutes
1 km	2:14.96 minutes
1.5 km	3:31.18 minutes

The following are some other athletic records.

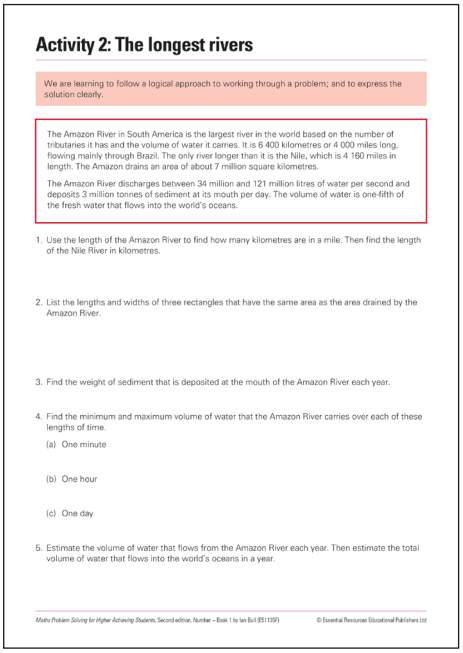
Indoor shot put	Long jump	Triple jump	High jump	Pole vault
22.66 m	8.79 m	17.83 m	2.43 m	6.15 m

These are the records for the relays.

Relay	Record
4 × 200 m	1:22.11 minutes
4 × 400 m	3:02.83 minutes
4 × 800 m	7:13.94 minutes

Activity 2: The longest rivers

1. Divide the number of kilometres by the number of miles for the same distance. This gives the number of kilometres per mile.
2. The area of a rectangle is the length multiplied by the width.
3. Three million tonnes are dumped each day. Take the number of days in a year to be 365.25, which accounts for a leap year every four years.
4. Multiply the number of litres coming out of the river by 60 to make the volume per minute, by 60 × 60 for each hour and by 60 × 60 × 24 for the volume of water for a day.
5. Take an average of the biggest and smallest amounts of water flowing out from the Amazon River and assume that this amount of water flows out every day.



Activity 2: The longest rivers

We are learning to follow a logical approach to working through a problem; and to express the solution clearly.

The Amazon River in South America is the largest river in the world based on the number of tributaries it has and the volume of water it carries. It is 6 400 kilometres or 4 000 miles long, flowing mainly through Brazil. The only river longer than it is the Nile, which is 4 160 miles in length. The Amazon drains an area of about 7 million square kilometres.

The Amazon River discharges between 34 million and 121 million litres of water per second and deposits 3 million tonnes of sediment at its mouth per day. The volume of water is one-fifth of the fresh water that flows into the world's oceans.

1. Use the length of the Amazon River to find how many kilometres are in a mile. Then find the length of the Nile River in kilometres.
2. List the lengths and widths of three rectangles that have the same area as the area drained by the Amazon River.
3. Find the weight of sediment that is deposited at the mouth of the Amazon River each year.
4. Find the minimum and maximum volume of water that the Amazon River carries over each of these lengths of time.
   (a) One minute
   (b) One hour
   (c) One day
5. Estimate the volume of water that flows from the Amazon River each year. Then estimate the total volume of water that flows into the world's oceans in a year.

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Activity 1: athletics records (continued)

Use the information on the previous page to help you answer these questions.

1. If Donovan Bailey could run at his record speed over longer distances, in what time would he run each of these races? Round each answer to two decimal places.

   (a) 60 m _____

   (b) 200 m _____

   (c) 400 m _____

   (d) 800 m _____

   (e) 1 km _____

   (f) 1.5 km _____

2. Find the difference between Donovan Bailey's imaginary time for each distance and the actual record. Note which is faster each time.

   (a) 60 m _____

   (b) 200 m _____

   (c) 400 m _____

   (d) 800 m _____

   (e) 1 km _____

   (f) 1.5 km _____

3. List the record distances for the shot put, long jump, triple jump, high jump and pole vault in ascending order.

   _____

4. Find the difference between the shot put record and the record for each of these events.

   (a) Long jump _____

   (b) Triple jump _____

   (c) High jump _____

   (d) Pole vault _____

5. Suppose Donovan Bailey ran each of the relays at 5.56 seconds for each 50 metres of the race. How would his total time for the race compare with the record?

   (a) 4×200 m

   (b) 4×400 m

   (c) 4×800 m

Activity 2: The longest rivers

We are learning to follow a logical approach to working through a problem; and to express the solution clearly.

The Amazon River in South America is the largest river in the world based on the number of tributaries it has and the volume of water it carries. It is 6 400 kilometres or 4 000 miles long, flowing mainly through Brazil. The only river longer than it is the Nile, which is 4 160 miles in length. The Amazon drains an area of about 7 million square kilometres.

The Amazon River discharges between 34 million and 121 million litres of water per second and deposits 3 million tonnes of sediment at its mouth per day. The volume of water is one-fifth of the fresh water that flows into the world's oceans.

1. Use the length of the Amazon River to find how many kilometres are in a mile. Then find the length of the Nile River in kilometres.

2. List the lengths and widths of three rectangles that have the same area as the area drained by the Amazon River.

3. Find the weight of sediment that is deposited at the mouth of the Amazon River each year.

4. Find the minimum and maximum volume of water that the Amazon River carries over each of these lengths of time.

   (a) One minute

   (b) One hour

   (c) One day

5. Estimate the volume of water that flows from the Amazon River each year. Then estimate the total volume of water that flows into the world's oceans in a year.

Answers

Activity 1: Athletics records

1. (a) $\frac{60}{50} \times 5.56 = 6.67$ s
   (b) $\frac{200}{50} \times 5.56 = 22.24$ s
   (c) $\frac{400}{50} \times 5.56 = 44.48$ s
   (d) $\frac{800}{50} \times 5.56 = 88.96$ s
   (e) $\frac{1\,000}{50} \times 5.56 = 111.20$ s
   (f) $\frac{1\,500}{50} \times 5.56 = 166.80$ s
2. (a) 6.67 – 6.39 = 0.28 s (record faster)
   (b) 22.24 – 19.92 = 2.32 s (record faster)
   (c) 44.57 – 44.48 = 0.09 s (Bailey faster)
   (d) 102.67 – 88.96 = 13.71 s (Bailey faster)
   (e) 134.96 – 111.2 = 23.76 s (Bailey faster)
   (f) 211.18 – 166.8 = 44.38 s (Bailey faster)
3. High jump (2.43 m), pole vault (6.15 m), long jump (8.79 m), triple jump (17.83 m), shot put (22.66 m)
4. (a) 22.66 m – 8.79 m = 13.87 m
   (b) 22.66 m – 17.83 m = 4.83 m
   (c) 22.66 m – 2.43 m = 20.23 m
   (d) 22.66 m – 6.15 m = 16.51 m
5. (a) Total distance is 800 m. Time at 5.56 s per 50 m = 5.56 × 16 = 88.96 s; difference in time: 82.11 – 88.96 = 6.85 s slower than the record.
   (b) Total distance is 1 600 m. Time at 5.56 s per 50 m = 5.56 × 32 = 177.92 s, difference in time: 182.83 – 177.92 = 4.91 s faster than the record.
   (c) Total distance is 3 200 m. Time at 5.56 s per 50 m = 5.56 × 64 = 355.84 s, difference in time: 433.94 – 355.84 = 78.1 s faster than the record.

Activity 2: The longest rivers

1. $\frac{6\,400}{4\,000} = 1.6$ so there are 1.6 kilometres in a mile.
   The Nile is 4 160 miles long, which is 4 160 × 1.6 = 6 656 km.
2. Area covered by the Amazon River is 7 000 000 square kilometres. Three rectangles that have the same area are: 7 000 km × 1 000 km, 700 km × 10 000 km, 70 000 km × 100 km. Other answers are possible.
3. Weight in a year = 3 000 000 tonnes × 365.25 = 1 095 750 000 tonnes
4. (a) Minimum: 34 million × 60 = 2 040 000 000 L or 2 040 million litres
   Maximum: 121 million × 60 = 7 260 000 000 L or 7 260 million litres
   (b) Minimum: 34 million × 60 × 60 = 122 400 000 000 L or 122 400 million litres
   Maximum: 121 million × 60 × 60 = 435 600 000 000 L or 435 600 million litres
   (c) Minimum: 34 million × 60 × 60 × 24 = 2 937 600 000 000 or 2 937 600 million litres
   Maximum: 121 million × 60 × 60 × 24 = 10 454 400 000 000 or 10 454 400 million litres
5. Using the average flow of water down the Amazon: (34 + 121) ÷ 2 = 77.5 million litres per second. The number of litres flowing each year is: (77.5 × 1 000 000) × 60 × 60 × 24 × 365.25 = 2 445 714 000 000 000 litres.
   The amount of water flowing into the oceans each year is 5 times the amount flowing out from the Amazon: 5 × 2 445 714 000 000 000 = 12 228 570 000 000 000 litres.