MATHS LITERACY
TEACHER SUPPORT WORKSHOP
MEASUREMENT - Tips & Tricks

CLASSROOM RESOURCES

THE ANSWER SERIES Your Key to Exam Success

Baseline Assessment for Measurement

A school needs to determine how many workers it needs to host a carnival with 15 different rides and an estimated attendance of 3 250 people.

1. Determine how many workers are needed per day. Use the formula:

$$\textbf{\textit{Workers per day}} = \textbf{\textit{number of rides}} \times 2 + \frac{\textbf{\textit{estimated number of attendees}}}{8}$$

The workers need to wipe down the rides with, on average, 5ℓ of disinfectant per ride.

2. Determine how many bottles of disinfectant will be needed, if they are sold in 12ℓ tins.

Answers

1. $$\textit{Workers per day} = \textit{number of rides} \times 2 + \frac{\textit{estimated number of attendees}}{8}$$

$$= 15 \times 2 + \frac{3\,250}{8}$$

Substitution

$$= 30 + 406{,}25$$

$$= 436{,}25 \text{ workers}$$

Operations on numbers & calculator skills

$$\approx 437 \text{ workers}$$

Rounding up

2. $$\text{Total disinfectant} = 5\ell \times 15 \text{ rides}$$

Rates

$$= 75\ell$$

$$\text{Number of bottles} = 75\ell \div 12\ell \text{ bottles}$$

Operations on numbers & calculator skills

$$= 6{,}25 \text{ bottles}$$

$$\approx 7 \text{ bottles}$$

Rounding up

HANDS ON EXPLORATION – PART 1

Dimensions

Choose 2 rectangular containers and 2 cylindrical containers. Using your ruler, determine the following:

RECTANGULAR CONTAINERS	CYLINDRICAL CONTAINERS
1. Container **A**: Measure the dimensions in cm: Length: …………………………………….. Breadth: …………………………………….. Height: ……………………………………..	1. Container **A**: Measure the dimensions in mm: Radius: …………………………………….. Diameter: …………………………………….. Height: ……………………………………..
2. Container **B**: Measure the dimensions in cm: Length: …………………………………….. Breadth: …………………………………….. Height: ……………………………………..	2. Container **B**: Measure the dimensions in mm: Radius: …………………………………….. Diameter: …………………………………….. Height: ……………………………………..
3. Which rectangular container is the deepest and by how much? ………………………………………………………………….. ………………………………………………………………….. …………………………………………………………………..	3. Which cylindrical container is the widest and by how much? ………………………………………………………………….. ………………………………………………………………….. …………………………………………………………………..

HANDS ON EXPLORATION – PART 2

CONVERSIONS

Conversions

Using the same 2 rectangular & 2 cylindrical containers from Part 1, convert:

RECTANGULAR CONTAINERS	CYLINDRICAL CONTAINERS
4. Container **A**: Convert your measurements from Part 1 from cm to the following: Length: ………………………… cm = …………………………mm Breadth: ………………………… cm = …………………………m Height: ………………………… cm = …………………………km	4. Container **A**: Convert your measurements from Part 1 from mm to the following: Radius: ………………………… mm = ……………………cm Diameter: ………………………… mm = ……………………m Height: ………………………… mm = ……………………km
5. Container **B**: Convert your measurements from Part 1 from cm to the following: Length: ………………………… cm = …………………………mm Breadth: ………………………… cm = …………………………m Height: ………………………… cm = …………………………km	5. Container **B**: Convert your measurements from Part 1 from mm to the following: Radius: ………………………… mm = ……………………cm Diameter: ………………………… mm = ……………………m Height: ………………………… mm = ……………………km

HANDS ON EXPLORATION PART 3

IRREGULAR SHAPES & COSTING

Costing & Spread Rate

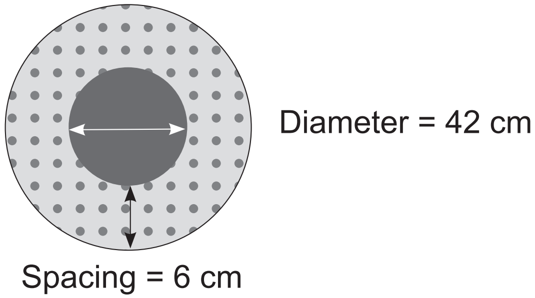
Using the same containers from Part 1 & 2, determine the following:

RECTANGULAR CONTAINERS	CYLINDRICAL CONTAINERS
6. If you put the smallest container into the larger container, determine the empty space between the two containers A and B in cm^3. ***Volume = length × breadth × height*** …………………………………………………………… …………………………………………………………… ……………………………………………………………	6. Calculate the TSA (excluding the lid) in cm^2. **Formula of a cylindrical container with a closed lid =** ***(2 × π × radius²) + (2 × π × radius × height)***; *where π = 3,142* …………………………………………………………… …………………………………………………………… ……………………………………………………………
7. If you had to fill the empty space between the two containers with oil, calculate the total cost of oil if it costs R65 per liter and is sold only in 2 liter bottles. …………………………………………………………… …………………………………………………………… ……………………………………………………………	7. If you had to paint the container (excluding the lid), determine the cost of the paint if the paint is sold for R49,99 per 500 ml bottle and the spread rate of the paint is 800 cm^2/ℓ. …………………………………………………………… …………………………………………………………… ……………………………………………………………

CONSOLIDATION – PART 1

Inner vs Outer Dimensions

Aldon is making a circular speed limit sign sticker, which measures 42 cm in diameter. The sticker will then be stuck in the centre of a circular metal backing, with a 6 cm space between the edge of the sticker and the edge of the metal backing, as shown below:



1. Determine the radius of the metal backing.

....

....

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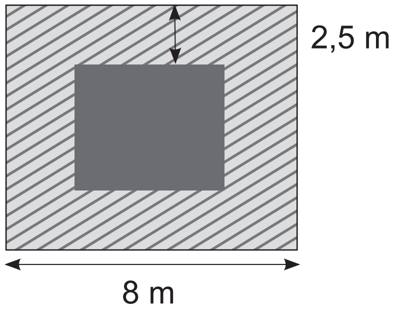
Rebecca would like to install a square pool, with a depth of 1,7 m, in her square garden which measures 8 m × 8 m. She needs to have a 2,5 m paving all around the pool, as shown below:



1. Determine the dimensions of the pool.

....

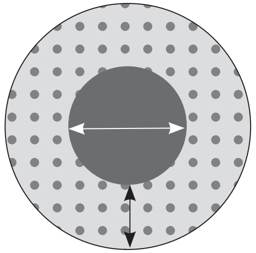
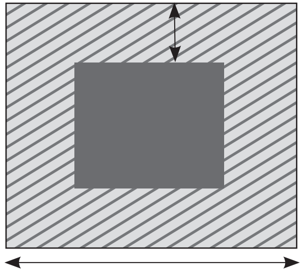
....

....

CONSOLIDATION – PART 2

FORMULAE

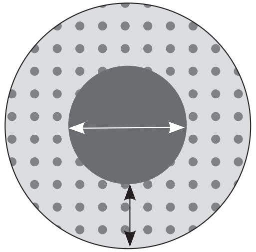
Area, Volume and Conversions

From Part 1: Circular speed limit sign stuck in the centre of a circular metal backing with a spacing of 6 cm between the sticker and edge of the metal: 	**From Part 1: Square pool, with a depth of 1,7 m; in a square garden; with a 2,5 m paving all around the pool:** 
2. Determine the area of the speed limit sticker in cm^2, using the formula: **Area =** $\pi \times$ **(radius)^2**; where $\pi = 3{,}142$	2. Determine the volume of the pool in cm^3, using the formula: **Volume = length $\times$ breadth $\times$ depth**
3. Convert the area into m^2.	3. Convert the volume into cm^3.

CONSOLIDATION PART 3

Irregular Shapes

From Part 2: Circular speed limit sign stuck in the centre of a circular metal backing with a spacing of 6 cm between the sticker and edge of the metal:



Diameter = 42 cm

Spacing = 6 cm

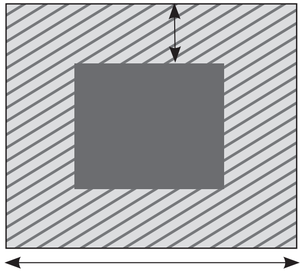
4. Determine the area of the exposed metal backing (dotted area) that is NOT covered by the sticker, using the formula:
   Area = $\pi \times$ (radius)^2; *where* π = 3,142

   ....

   ....

   ....

From Part 2: Square pool, with a depth of 1,7 m; in a square garden; with a 2,5 m paving all around the pool:



2,5 m

8 m

4. Determine the area of the paving (striped area) around the pool, using the formula:
   Area = length $\times$ breadth

   ....

   ....

   ....

Worked Examples - Reverse calculations

A preschooler was told to make a basic figure of a "man" by cutting and pasting a triangle (for the hat), circle (for the face) and rectangle (for the body), as shown alongside:

1. Determine the base of the triangle, given that the perimeter of the triangle is 25 cm. Use the formula:

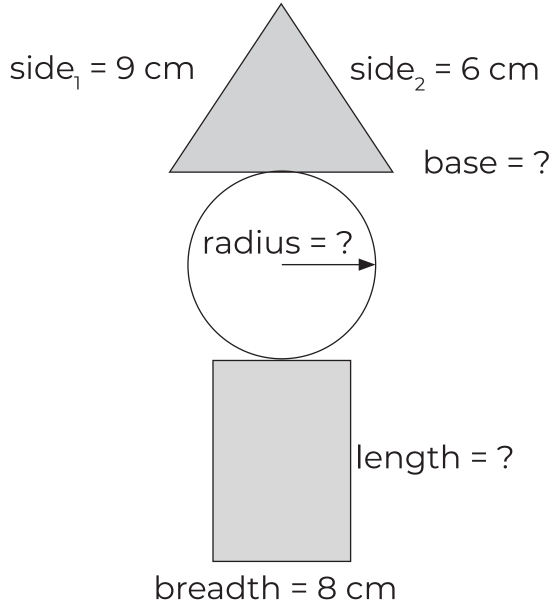
   Perimeter $= \boldsymbol{side_1 + side_2 + base}$

   Perimeter $= side_1 + side_2 + base$

25 = 9 + 6 + base	... substitute
25 = 15 + base	... simplify first!
25 – 15 = base	... opposite operation
10 cm = base	... simplify & add units

1 + ↔ –

Keep variables on the given side!



Worked Examples - Reverse calculations

A preschooler was told to make a basic figure of a "man" by cutting and pasting a triangle (for the hat), circle (for the face) and rectangle (for the body), as shown alongside:

2. Calculate the length of the man's body, if the area of the rectangular body is 96 cm^2. Use the formula:

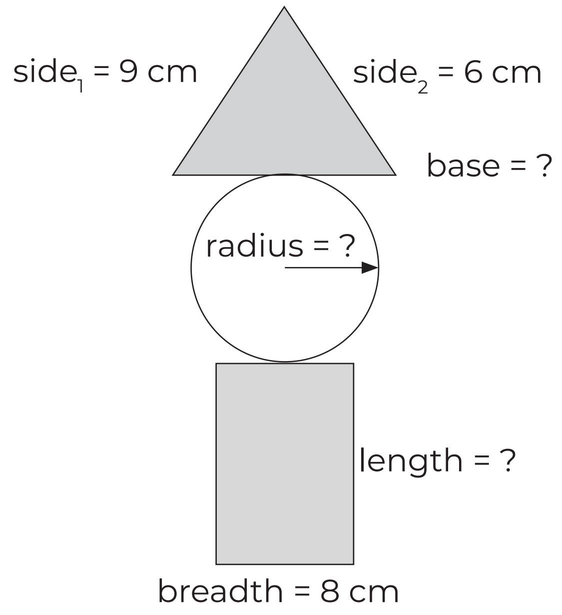
   Area = length × ***breadth***

   Area = length × breadth

96 = length × 8	... substitute
96 ÷ 8 = length	... opposite operation
12 cm = length	... simplify & add units

2 × ↔ ÷

Keep variables on the given side!



Worked Examples - Reverse calculations

A preschooler was told to make a basic figure of a "man" by cutting and pasting a triangle (for the hat), circle (for the face) and rectangle (for the body), as shown alongside:

3. Determine the radius of the man's face, if the area is 78,55 cm^2.
   Use the formula:

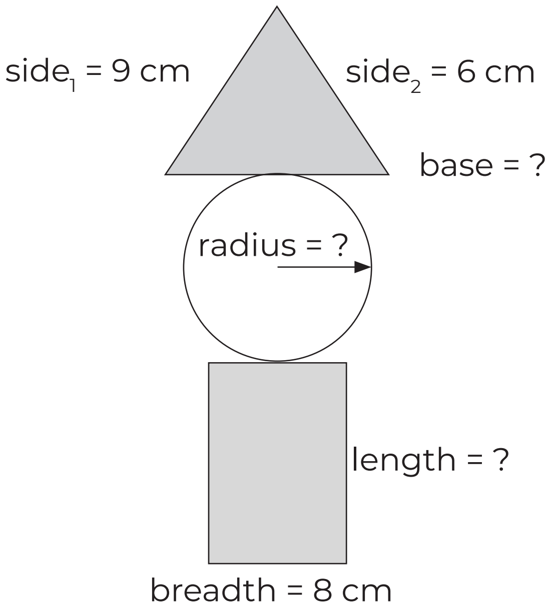
   Area $= \pi \times$ ***radius***^{2}; *where* $\pi = 3{,}142$

3 $x^2 \leftrightarrow \sqrt{x}$
Square ↔ Square-root

Area $= \pi \times$ *radius*^{2}

$78{,}55$	$= 3{,}142 \times radius^2$	... substitute incl. π
$78{,}55 \div 3{,}142$	$= radius^2$	... opposite operation
25	$= radius^2$	... simplify
$\sqrt{25}$	$= radius$	... opposite operation
5 cm	$= radius$	... simplify & add units

Keep variables on the given side!



Exam Practice!

Answers

FORMULAE

3.2 More water must be taken to the refreshment stations. The water will be transported in cylindrical buckets (with lids) with a maximum capacity of 20 litres of water.

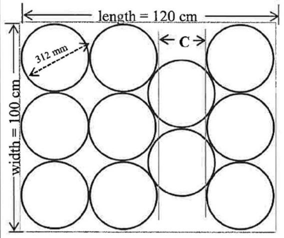
The cylindrical buckets, containing water, with lids are shown below.

Picture of a bucket (20 ℓ capacity) with lid

Outside diameter of bucket = 31,2 cm

NOTE: Bucket walls are 2 mm thick.

Top view of buckets placed on a solid rectangular pallet



[Source: www.meyaplast.co.uk]

Use the information and picture above to answer the questions that follow.

3.2.1 Determine the maximum height (in cm) of the water in the bucket if the outside diameter of the bucket is 31,2 cm.

You may use the formula:

Volume of a cylinder = π × (radius)^2 × height

where π = 3,142 and 1 ℓ = 1 000 cm^3 (7)

3.2.2 Buckets are placed on the pallet, as shown in the diagram above.

(a) Calculate the unused area (in cm^2) of the rectangular floor of the solid pallet.

You may use the formula:

Area of a circle = π × (radius)^2, where π = 3,142 (6)

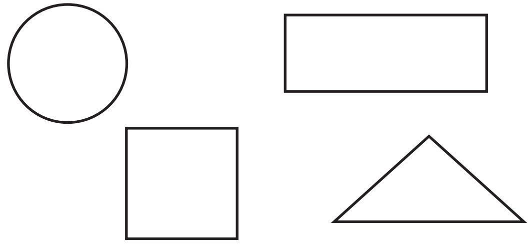
(b) Determine length **C**, as shown in the diagram above. (3)

3.2.1	20 ℓ = 20 × 1 000 cm^3 ✓C Inner diameter /*Binneste middellyn* = 31,2 cm – 2 × 0,2 cm = 30,8 cm ✓A ✓MCA V = 3,142 × (30,8cm ÷ 2)^2 × height/*hoogte* ✓SF 20 000 cm^3 = 3,142 × ($\frac{30,8}{2}$cm)^2 × **H** H = $\frac{20\,000\text{ cm}^3}{3,142 \times 237,16\text{cm}^2}$ ✓M = $\frac{20\,000}{745,15672}$ cm ✓S = 26,84 cm ✓CA	1C conversion 1A calculating inner diameter 1MCA radius 1SF correct values 1M changing the subject 1S simplification 1CA height (7)	M L3
3.2.2 (a)	Area of base of 1 bucket/*Oppervlakte van 1 emmer basis* ✓A = 3,142 × (15,6 cm)^2 = 764,63712 cm^2 ✓CA Area of base of 11 buckets/*Oppervlakte van 11 emmers* = 11 × 764,63712 cm^2 = 8 411,00832 cm^2 ✓CA Area of base of pallet/*Oppervlakte van palletbasis* ✓SF = 100 cm × 120 cm = 12 000 cm^2 ✓A Difference/*Verskil* = 12 000 cm^2 – 8 411,00832 cm^2 = 3 588,99168 cm^2 ✓CA	1A radius 1CA simplification 1CA multiply by 11 1SF correct values 1A rectangular area 1CA area unused **NPR** (6)	
3.2.2 (b)	✓A 120 cm = 31,2 × 3 + C C = 120 cm – 31,2 cm × 3 ✓M = 26,4cm ✓CA	1A 120 cm 1M multiplying and subtracting 1CA finding C (3)	

Approaching Irregular Shapes

IRREGULAR SHAPES & COSTING

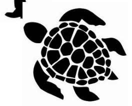
1 Break down shapes



2 Convert dimensions to required units

“Bunny hops” 

”Giant steps” 

”Turtle strokes” 

3 + or – shapes

Adding shapes e.g. house OR
Subtracting shapes e.g. spaces between

4 Select appropriate formula

Understanding formula NB!

5 Making sense of answer

Rounding off & Costing

Costing

IRREGULAR SHAPES & COSTING

Fencing/gates
↓
Perimeter
↓
Sold per whole/half units
↓
Round UP
↓
∴ Cost = r/o perimeter × R... per unit

Carpeting/flooring
↓
Area
↓
Sold per whole/half units
↓
Round UP
↓
∴ Cost = r/o area × R... per unit^2

Pools/liquids
↓
Volume
↓
Charged per whole unit
↓
Round UP
↓
∴ Cost = r/o volume × R... per unit^3

Spread Rates & Costing

Painting → TSA

Spread rate of paint is the volume of paint per unit^2

Paint needed (*volume*)
= TSA ÷ Spread rate

Sold per tin (*volume*)

Number of tins needed
= Paint needed (*volume*) ÷ Tin volume

Round UP

∴ Cost = r/o tins × R... per tin

IRREGULAR SHAPES & COSTING

Painting a bedroom with TSA = 147 m^2

Spread rate of paint = 20 m^2/ℓ

Paint needed (ℓ) = 147 m^2 ÷ 20 m^2/ℓ
= 7,35 ℓ

Tins come in 2 ℓ @ R199 per tin

Number of tins = 7,35 ℓ ÷ 2 ℓ
= 3,675
≈ 4 tins

∴ Cost m = 4 tins × R199 per tin
= R796

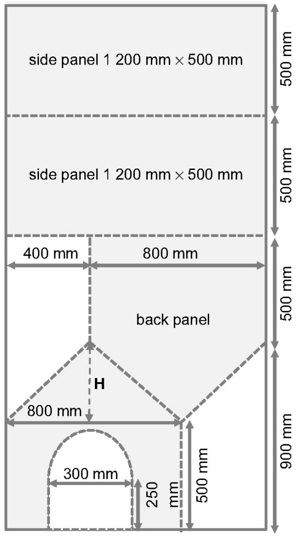
Let's Practice!

EXERCISE 2

Answers on page A27

Use the formulae on p. 150 to answer the following questions:

1. Mr Handyman wants to build a kennel for his puppy, Canin. The measurements for the kennel are given alongside.



1.1 Determine the *dimensions* of the large plywood sheet that Mr Handyman will need in order to cut out all the panels shown on the diagram? Give your answer in both mm and in m.

1.2 Calculate the area of the side panels in m^2.

1.3 If the height of the kennel is 900 mm and the height of the side panel is 500 mm, find the length of H on the diagram.

1.4 Calculate the area of the back panel of the kennel in m^2.

1.5 Calculate the area of the door (in m^2) that needs to be cut out from the front panel.

HINT: *The door is made up of a rectangle and a semicircle.*

1.6 Calculate the area of the front panel in m^2 *(the front panel is the panel with the door).*

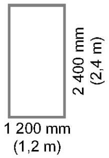
1.7 Calculate the total area of the kennel in m^2 (*the shaded area on the drawing*).

1.8 Calculate the area of the sheet of plywood that will not be used (*the unshaded area on the drawing*).

Answers

EXERCISE 2

1.1 Dimensions
$= (800 + 400) \times (500 + 500 + 500 + 900)$
$= 1\,200 \text{ mm} \times 2\,400 \text{ mm}$
$= 1{,}2 \text{ m} \times 2{,}4 \text{ m}$



1.2 Side panels:
$A = \ell \times b$
$= (1{,}2 \times 0{,}5) \times 2$ panels
$= 0{,}6 \times 2$
$= 1{,}2 \text{ m}^2$

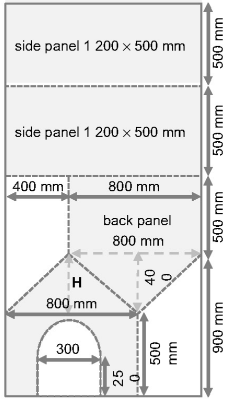
500 mm = 500 ÷ 1 000
= 0,5 m

1.3 $H = 900 - 500 = 400 \text{ mm}$

1.4 Back panel
= rectangle + triangle
$= (\ell \times b) + \left(\frac{1}{2}.b.h\right)$
$= (800 \times 500) +$
$\left(\frac{1}{2}.\ 800.400\right)$

800 mm = 0,8 m
400 mm = 0,4 m
500 mm = 0,5 m

$= (0{,}8 \times 0{,}5) + \left(\frac{1}{2}.0{,}8.0{,}4\right)$
$= 0{,}4 \text{ m} + 0{,}16 \text{ m}$
$= 0{,}56 \text{ m}^2$



1.5 Door = rectangle + $\frac{1}{2}$ circle
$= (\ell \times b) + \left(\frac{1}{2}.\ \pi r^2\right)$
$= (0{,}30 \times 0{,}25) + \left(\frac{1}{2} \times 3{,}142 \times 0{,}15^2\right)$
$= 0{,}075 + 0{,}0353$
$= 0{,}11 \text{ m}^2$

250 mm = 0,25 m
300 mm = 0,3 m
diameter = $\frac{0{,}3}{2}$
= 0,15 m

1.6 Area front panel = area back panel - area door
$= 0{,}56 - 0{,}11 = 0{,}45 \text{ m}^2$

1.7 TSA = front + back + side panels
$= 0{,}45 + 0{,}56 + 1{,}2 = 2{,}21 \text{ m}^2$

1.8 Unshaded area = (total area of plywood - used area)
$= (1{,}2 \times 2{,}4) - 2{,}21$
$= 2{,}88 - 2{,}21 = 0{,}67 \text{ m}^2$

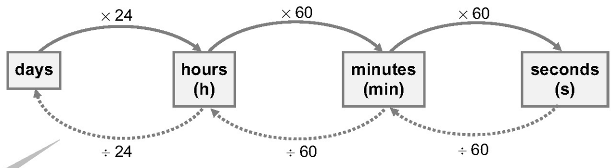
Conversions and Calculations involving Units of Time

- **General Method:**
  - **BIG** unit down to a **SMALLER** unit → **MULTIPLY** by the conversion factor
  - **SMALL** unit up to a **BIGGER** unit → **DIVIDE** by the conversion factor

- **Conversion diagram:**

days → hours → minutes → seconds

big to small ∴ × by conversion factor



This diagram should be committed to memory!

seconds → minutes → hours → days

small to big ∴ ÷ by conversion factor

- **Conversion tables:**

days to h	× by 24
h to min	× by 60
min to s	× by 60

s to min	÷ by 60
min to h	÷ by 60
h to days	÷ by 24

NB: *You are also expected to know the following:*
- *1 year = 365 days*
- *1 year = ± 52 weeks*
- *1 month = ± 4 weeks*
- *1 week = 7 days*

Conversions

TIME

Pop Quiz!

1. How many days in a year?
2. How many minutes in an hour?
3. How many hours in a day?
4. How many seconds in a minute?
5. How many months in a year?
6. How many days in May?
7. How many working days in a week?

Let’s Practice – CHALLENGE!

Convert 557 799 seconds to days, hours, minutes and seconds.

Answer

$557\ 799 \text{ s} = 557\ 799 \div 60 = 9\ 296{,}65 \text{ min}$

$\therefore\ 9\ 296{,}65 \text{ min} = 9\ 296{,}65 \div 60 \text{ s}$
$= 154{,}9441667 \text{ h}$

$\therefore\ 154{,}9441667 \text{ h} = 154{,}9441667 \div 24$
$= 6{,}456006944 \text{ days}$

$\therefore\ 6{,}456006944 \text{ days}$
$= 6 \text{ days} + 0{,}456006944 \text{ days}$
$= 6 \text{ days} + 0{,}456006944 \text{ days} \times 24 \text{ h}$
$= 6 \text{ days} + 10{,}94416667 \text{ h}$

$\therefore\ 10{,}94416667 \text{ h}$
$= 10 \text{ h} + 0{,}94416667 \text{ h}$
$= 10 \text{ h} + 0{,}94416667 \times 60 \text{ min}$
$= 10 \text{ h} + 56{,}65 \text{ min}$

$\therefore\ 56{,}65 \text{ min}$
$= 56 \text{ min} + 0{,}65 \text{ min} \times 60 \text{ s}$
$= 56 \text{ min} + 39 \text{ s}$

$\therefore\ 557\ 799 \text{ s}$
$= 6 \text{ days; } 10 \text{ h; } 56 \text{ min and } 39 \text{ s}$

Let's Practice!

4. The table below shows the running times of two different athletes during the 2015 Comrades Marathon at various points along the route. One of the athletes won the marathon and the other came second.

Athlete A		
Place on the route	**Distance run (km)**	**Total running time (h, min, s)**
Lion Park	15,9	01:08:07
Camperdown	26,9	01:55:19
Halfway	45	03:13:20
Pinetown	68,9	05:01:32
Mayville	82,3	06:03:07
Finish	89,3	06:36:03

Athlete B		
Place on the route	**Distance run (km)**	**Total running time (h, min, s)**
Lion Park	15,9	01:05:26
Camperdown	26,9	01:50:39
Halfway	45	03:05:14
Pinetown	68,9	04:54:45
Mayville	82,3	06:02:45
Finish	89,3	06:37:30

4.1 Who out of the two athletes came in first?

4.2 How far is it from Pinetown to the Finish?

4.3 How long (in hours, minutes and seconds) did it take Athlete A to run from Lion Park to Halfway?

4.4 How long (in hours, minutes and seconds) did it take Athlete B to run from Camperdown to Mayville?

4.5 Approximately where in the race did Athlete A overtake Athlete B? Explain your answer.

Answers

4.1 Runner A

4.2 Distance to Pinetown = 68,9 km
Distance to Finish = 89,3 km

∴ Distance from Pinetown to Finish
= 89,3 km - 68,9 km
= 20,4 km

4.3 Running time at Lion Park = 1 h 8 min 7 s
Running time at Half Way = 3 h 13 min 20 s

∴ 3 h ; 13 min ; 20 s
- 1 h ; 8 min ; 7 s
2 h ; 5 min ; 13 s

4.4 Running time at Camperdown = 1 h 50 min 39 s
Running time Mayville = 6 h 2 min 45 s

5 60 + 2 = 62 min
∴ $\cancel{6}$ h ; $\cancel{2}$ min ; 45 s
- 1 h ; 50 min ; 39 s
4 h ; 12 min ; 6 s

4.5 Between Mayville and the Finish, i.e. Runner B came through Mayville in a quicker time than Runner A, but Runner A then finished the race before runner B. So Runner A passed Runner B somewhere between Mayville and the Finish.

Let's Practice!

5. Pete is an avid leisure fisherman and keeps an eye on the tide timetable. Study the Simon's Town Tide Timetable for a part of November 2014 below in order to answer the following questions:
   - 5.1 Write down the solar times for 3 November in 12-hour format.
   - 5.2 Calculate the time difference between the Spring Tide and Lowest Tide on 6 November.
   - 5.3 On which days should Pete go out fishing? Give a reason for your answer.
   - 5.4 How much later is the first low tide on 4 November, as opposed to the first low tide on 5 November?
   - 5.5 Pete is only able to go out fishing on Saturday, 8 November, from 2:15 pm - 5:00 pm. What percentage of his fishing time out will be considered as the 'best fishing time'?

SIMON'S TOWN TIDE TABLE
NOVEMBER 2014

FISH-O-METER
Best fishing days
Good fishing days
Slow fishing days
Solunar Theory
Please note that the best fishing periods are for the leisure fisherman and peak fishing times during night time have not been listed.
Spring Tide:
06 Nov 2014 @ 14:43 (1,92 m)

Lowest Tide:
06 Nov 2014 @ 21:02 (0,23 m)

Sunday	Monday	Tuesday	Wednesday	Thursday	Friday	Saturday
						1 SOLAR Sunrise 05:45 Sunset 19:14 LUNAR Moonset 01:58 Underfoot 07:42 Moonrise 13:31 Overhead 20:08 TIDE TIMES Low tide 04:00 High tide 10:19 Low tide 17:01 High tide 23:04 BEST FISHING 15:27 to 16:29
2 SOLAR Sunrise 05:44 Sunset 19:15 LUNAR Moonset 02:39 Underfoot 08:35 Moonrise 14:37 Overhead 21:01 TIDE TIMES Low tide 05:20 High tide 11:33 Low tide 18:07 High tide --:-- BEST FISHING 12:05 to 13:07	3 SOLAR Sunrise 05:43 Sunset 19:16 LUNAR Moonset 03:19 Underfoot 09:27 Moonrise 15:42 Overhead 21:53 TIDE TIMES High tide 00:12 Low tide 06:21 High tide 12:31 Low tide 18:59 BEST FISHING 13:03 to 14:05	4 SOLAR Sunrise 05:42 Sunset 19:17 LUNAR Moonset 03:58 Underfoot 10:20 Moonrise 16:48 Overhead 22:46 TIDE TIMES High tide 01:04 Low tide 07:11 High tide 13:19 Low tide 19:44 BEST FISHING 13:51 to 14:53	5 SOLAR Sunrise 05:41 Sunset 19:18 LUNAR Moonset 04:38 Underfoot 11:13 Moonrise 17:54 Overhead 23:39 TIDE TIMES High tide 01:49 Low tide 07:55 High tide 14:02 Low tide 20:24 BEST FISHING 14:34 to 15:36	6 SOLAR Sunrise 05:40 Sunset 19:19 LUNAR Moonset 05:19 Underfoot 12:06 Moonrise 18:59 Overhead --:-- TIDE TIMES High tide 02:30 Low tide 08:36 High tide 14:43 Low tide 21:02 BEST FISHING 14:11 to 15:15	7 SOLAR Sunrise 05:40 Sunset 19:20 LUNAR Overhead 00:33 Moonset 06:03 Underfoot 13:00 Moonrise 20:01 TIDE TIMES High tide 02:30 Low tide 08:36 High tide 14:43 Low tide 21:02 BEST FISHING 14:49 to 15:53	8 FULL SOLAR Sunrise 05:39 Sunset 19:21 LUNAR Overhead 01:27 Moonset 06:50 Underfoot 13:54 Moonrise 21:01 TIDE TIMES High tide 03:47 Low tide 09:51 High tide 15:58 Low tide 22:12 BEST FISHING 14:24 to 15:26

Answers

5.1 Sunrise (05:43) → 5.43 am
Sunset (19:16) → 7.16 pm

5.2
$$\begin{array}{lr} & {}^{20}\ \ {}^{60+2=62} \\ \text{Lowest tide:} & \cancel{21}:\cancel{02} \\ -\ \text{Spring tide:} & \underline{-\ 14:43} \\ & 6:19 \end{array}$$
∴ 6 hours 19 minutes

5.3 3 - 8 November as the 'Fish-O-Meter' indicates these are the 'Best fishing days'.

5.4
$$\begin{array}{lr} \text{First low tide on 5 November:} & 07:55 \\ -\ \text{First low tide on 4 November:} & \underline{-\ 07:11} \\ & 00:44 \end{array}$$
∴ 44 min later

5.5 Fishing Time out:

- 2.15 pm - 5.00 pm

$$\begin{array}{lr} & {}^{16}\ \ {}^{60} \\ \therefore & \cancel{17}:\cancel{00} \\ - & \underline{14:15} \\ & 2:45 \end{array}$$
∴ 2 h 45 min fishing time out

- Best fishing time: 14:24 - 15:26

$$\begin{array}{r} \therefore\ 15:26 \\ \underline{-\ 14:24} \\ 1:02 \end{array}$$
∴ 1 h 2 min best fishing time

- $\% = \dfrac{\text{best fishing time}}{\text{fishing time out}} \times 100\%$

$= \dfrac{1 \text{ h } 2 \text{ min}}{2 \text{ h } 45 \text{ min}} \times 100\%$

$= \dfrac{62 \text{ min}}{165 \text{ min}} \times 100\%$

$= 37{,}58\%$

1 h 2 min
= 60 + 2 = 62 min
2 h 45 min
= 120 + 45 = 165 min