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Learning MATHS

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6B

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Learning Maths Book 6B

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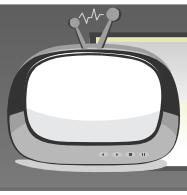
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PREFACE

Learning Maths Book 6B is a comprehensive workbook that provides students with ample practice on various mathematics question types. How is the book helpful to students?

Summary of Learning Outcomes
Refer to the overview of the topics in the book which sets the pace for learning each topic.

Formulae Sheet
Check and recall the essential and critical mathematical formulae and information for each topic.

Free Online Activities
Go online to try the fun activities. Refer to the Contents page to access them.

Topical Exercises
Work on these questions as you learn and become familiar with various question types.

Use of Calculators
Learn to use the calculator to work out your answers through specially designed question types.

Revision Papers
Test yourself. This is the best way to assess your understanding of the topics taught and learnt.

Non-routine Questions
Understand the heuristics better. Try these non-routine questions to develop your thinking and analytical skills.

Step-by-step Solutions
Learn from the carefully worked out solutions included at the back of the book.

Through this comprehensive workbook, students can gain a thorough understanding of the mathematical concepts, hone their problem-solving skills and develop creative and critical thinking skills. This book will inspire confidence as the student progresses.

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❷ Click on the title of the book.
❸ Key in the 13-digit ISBN of this book (found on back cover).



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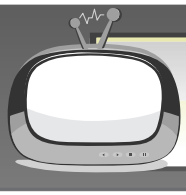
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LEARNING OUTCOMES

Unit 7 Speed

Students should be able to

- find speed, time and distance using the formula
- find average speed
- understand and write speed in different units such as km/h, m/min, m/s and cm/s
- solve word problems related to speed

Unit 8 Circles

Students should be able to

- recognise centre, radius, diameter and circumference of a circle
- recognise semicircle and quarter circle
- calculate the circumference and area of a circle using the formula
- solve word problems related to circles

Revision 1

This revision paper tests a student's understanding of Units 7& 8.

Unit 9 Pie Charts

Students should be able to

- understand and interpret pie charts
- solve 1-step word problems related to pie charts

Unit 10 Area and Perimeter

Students should be able to

- calculate the perimeter of a composite figure made up of either rectangles, squares, triangles, circles, semicircles or quarter circles
- calculate the area of a composite figure made up of either rectangles, squares, triangles, circles, semicircles or quarter circles
- solve word problems related to area and perimeter

Revision 2

This revision paper tests a student's understanding of Units 9 & 10.

Unit 11 Volume

Students should be able to

- find square root and cube root with the use of a calculator
- calculate the volume of solids
- find the edge of a cube/cubical tank given its volume
- find one dimension of a cuboid/rectangular tank given its volume and the other dimension
- find the height of a cuboid/rectangular tank given its volume and base area
- find the area of a face of a cuboid/rectangular tank given its volume and one dimension
- calculate the volume of water in a cubical/ rectangular container
- calculate the height of water level in a cubical/ rectangular container
- solve word problems related to volume.

Unit 12 Challenging Word Problems

Students should be able to

- solve word problems related to whole numbers, fractions, decimals, ratio, percentage and speed

Revision 3

This revision paper tests a student's understanding of Units 11 & 12.

Final Revision

This revision paper is an excellent assessment of a student's understanding of all the topics learnt in the primary mathematics education.

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FORMULAE SHEET

Unit 7 Speed

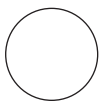
Distance = Speed × Time

Time = Distance ÷ Speed

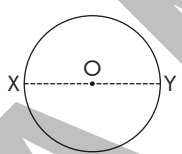
Speed = Distance ÷ Time

Average speed = Total distance ÷ Total time

Unit 8 Circles

Types of circles	Diagram
circle	
half circle / semicircle	
quarter circle / quadrant	

In this circle,



O is the **centre** of the circle.

XY is the **diameter** of the circle.

OX is the **radius** of the circle.

OX and OY are the radii of the circle.

Circumference

Circumference is also known as perimeter. It is the outline of a circle.

Diameter

Diameter of a circle is a straight line extends from one point along the circumference to another point. It will pass through the centre of the circle.

diameter = 2 × radius

Examples: XY = 2 × OX or XY = 2 × OY

Radius

Radius of a circle is a straight line that extends from the centre to any point along the circumference. All radii of a circle are equal.

Example: OX = OY

Finding the circumference of a circle

Circumference = πd or $2\pi r$

where $\pi = \frac{22}{7}$ or 3.14, d is diameter and r is radius.

Finding the circumference of a semicircle

Circumference = $\frac{\pi d}{2}$ or $\frac{2\pi r}{2}$

where $\pi = \frac{22}{7}$ or 3.14, d is diameter and r is radius.

Finding the circumference of a quadrant

Circumference = $\frac{\pi d}{4}$ or $\frac{2\pi r}{4}$

where $\pi = \frac{22}{7}$ or 3.14, d is diameter and r is radius.

Finding the area of a circle

Area = πr^2

where $\pi = \frac{22}{7}$ or 3.14 and r is radius.

Finding the area of a semicircle

Area = $\frac{\pi r^2}{2}$

where $\pi = \frac{22}{7}$ or 3.14 and r is radius.

Finding the area of a quadrant

Area = $\frac{\pi r^2}{4}$

where $\pi = \frac{22}{7}$ or 3.14 and r is radius.

Unit 9 Pie Charts

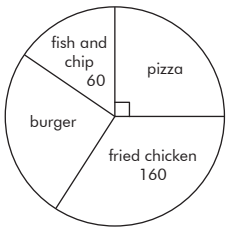
Pie chart is a pictorial graph that organizes information. Pie chart uses a circle as a representation of a whole or 100%.

In the circle, there are different segments. Each segment represents a fraction or percentage of the total quantity.

We can gather information from a pie chart and use them to answer questions.

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Example:
The pie chart below represents the number of students who like different types of fast food.



Unit 10 Area and Perimeter

Figure	Perimeter	Units of measurement	Area	Units of measurement
circle	πd or $2\pi r$ $\pi = \frac{22}{7}$ or 3.14 d is diameter r is radius	cm/m	πr^2 $\pi = \frac{22}{7}$ or 3.14 r is radius	cm^2/m^2
semicircle	$\frac{\pi d}{2}$ or $\frac{2\pi r}{2}$ $\pi = \frac{22}{7}$ or 3.14 d is diameter r is radius	cm/m	$\frac{\pi r^2}{2}$ $\pi = \frac{22}{7}$ or 3.14 r is radius	cm^2/m^2
quadrant	$\frac{\pi d}{4}$ or $\frac{2\pi r}{4}$ $\pi = \frac{22}{7}$ or 3.14 d is diameter r is radius	cm/m	$\frac{\pi r^2}{4}$ $\pi = \frac{22}{7}$ or 3.14 r is radius	cm^2/m^2
square	$4 \times L$ L is length	cm/m	$L \times L$ L is length	cm^2/m^2
rectangle	$2 \times B + 2 \times L$ L is length B is breadth	cm/m	$L \times B$ L is length B is breadth	cm^2/m^2
triangle	Add the three sides of a triangle.	cm/m	$\frac{1}{2} \times B + H$ B is base H is height	cm^2/m^2

Unit 11 Volume

Square root is a number when it is multiplied by itself to get another number.

Symbol: $\sqrt[2]{}$

Example: Find the square root of 25.

$\sqrt[2]{25} = 5$

Cube root is a number when it is multiplied by itself twice to get another number.

Symbol: $\sqrt[3]{}$

Example: Find the cube root of 8.

$\sqrt[3]{8} = 2$

Volume and Capacity

Volume of a solid is the amount of space in it.

Capacity of a solid is the amount of liquid that it can hold completely.

Units of measurement: cm^3/m^3

$1\ \ell = 1000\ cm^3$

Cube

Volume of a cube = Edge × Edge × Edge

Edge of a cube = $\sqrt[3]{\text{Volume}}$

Cuboid

Volume of a cuboid = Length × Breadth × Height

Length of a cuboid = $\frac{\text{Volume}}{\text{Breadth} \times \text{Height}}$

Breadth of a cuboid = $\frac{\text{Volume}}{\text{Length} \times \text{Height}}$

Height of a cuboid = $\frac{\text{Volume}}{\text{Length} \times \text{Breadth}}$

Base area = Length × Breadth = $\frac{\text{Volume}}{\text{Height}}$

Height of water level = $\frac{\text{Volume}}{\text{Base area}}$

Capacity of a container = Length × Breadth × Height

Note that the height refers to height of the container.

Amount of water needed to fill the container completely = Capacity – Volume of water in the container

Time taken to fill an empty container completely = $\frac{\text{Capacity}}{\text{rate of water flow}}$

Unit 12 Challenging Word Problems

When attempting a challenging word problem,

① read the word problem carefully to gain a better understanding

② analyse the word problem and come up with a plan

③ use one or more of the following heuristics to solve the word problem

- draw a model/diagram
- make a list
- use an equation
- guess and check
- look for pattern(s)
- make supposition(s)
- act it out
- work backwards
- before-after approach
- restate the problem
- simplify the problem

④ After obtaining the answer, apply it to the question to check for reasonableness of answer.

⑤ If the answer is not reasonable, you have to go back to the first step again.

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7 SPEED

Examples

1. Joel jogs at a speed of 120 m/min for 10 minutes. Find the distance that he has jogged.

   Distance = Speed × Time
   = 120 × 10
   = 1200 m

   He has jogged **1200 m**.

2. Betsy takes 5 minutes to walk to her grandmother's house which is 585 m away from her house. She takes 4 minutes to walk back to her house using the same route. Find her average speed.

   Average speed = Total distance ÷ Total time
   = (585 + 585) ÷ (5 + 4)
   = 130 m/min

   Her average speed is **130 m/min**.

Fill in each blank with the correct answer.

1. Clifford runs 550 m in one minute. What is his running speed?

   _____

2. Lorraine swims 1 m in one second. What is her swimming speed?

   _____

SAMPLE

3. Mindy cycles at a speed of 6 km/h. How far does she cycle in an hour?

_____

4. Grandmother walks at a speed of 1 m/s to the community centre. How far does she walk in a second?

_____

5. Mrs Adams drives at a speed of 60 km/h. What is the distance that she has driven in an hour?

_____

6. An ant crawls at a speed of 2 cm/s. How far does it crawl in a second?

_____

Fill in each box with the correct answer.

	Time	Distance	Speed
7.	2 h	194 km	
8.	30 min		116 m/min
9.		50 m	10 m/s
10.	60 h	1560 km	
11.		336 m	8 m/min
12.	2 s		14 cm/s
13.	19 h	988 km	
14.		1829 m	59 m/s
15.	67 min		99 m/min
16.	48 s	768 m	

SAMPLE

Find the average speed.

17.

Distance	32 m	48 m
Time	9 min	7 min
Average speed		

18.

Distance	372 cm	243 cm
Time	8 s	7 s
Average speed		

19.

Distance	150 km	630 km	240 km
Time	11 min	30 min	19 min
Average speed			



20.

Distance	461 m	239 m	1250 m
Time	18 min	7 min	35 min
Average speed			



21.

Distance	603 km	894 km	375 km
Time	21 min	18 min	9 min
Average speed			

Write your answers on the lines provided.

22. A car travels at a speed of 55 km/h. How far can it travel in 4 hours?

_____



23. A train travelled at a speed of 64 km/h. How long did it take to travel a distance of 416 km?

_____

SAMPLE

24. Becky walks to the stadium which is 580 m away from her house for 20 minutes. She walks back to her house using the same route at a speed of 20 m/min. What is Becky's average speed?

_____

25. Ron took $1\frac{1}{2}$ hours to drive to his office. His office was 120 km away from his house. Find his driving speed.

_____

26. A coach travels from Point A to Point B at a speed of 75 km/h for $4\frac{4}{5}$ hours. How far is Point A from Point B?

_____

27. An aeroplane travelled the first 96 km of a journey at an average speed of 16 km/min. It then travelled another 18 minutes at a speed of 12 km/min. Find the average speed of the aeroplane for the whole journey.

_____

28. An arrow can travel at a speed of 186 m/s. How long does it take for the arrow to travel a distance of 2046 m?

_____

29. Tiffany spent 24 minutes travelling from Point A to Point B at a speed of 95 km/h. How far was Point A from Point B?

_____

30. A golf ball rolls at a speed of 8 m/s for 12 seconds. Mandy hits the golf ball and it rolls for 16 seconds at a speed of 12 m/s. What is the total distance travelled by the golf ball?

_____

31. Billy drove at a speed of 60 km/h for $2\frac{2}{3}$ hours. Then he drove for another $1\frac{1}{2}$ hours at a speed of 45 km/h. How far was his journey?

_____

SAMPLE

Do these word problems. Show your working clearly in the space provided.

32. The distance round a field is 540 m. Ruth runs round the field for 8 times in half an hour. What is her average speed? Express your answer in m/min.

33. The distance from Singapore to Kuala Lumpur is 396 km. Sam drives from Singapore to Kuala Lumpur at an average speed of 120 km/h. If he starts his journey at 10 45, at what time will he reach Kuala Lumpur? Express the time using the 24-hour clock.



34. Mr Baker drives from his house to the office at a speed of 82 km/h in 15 minutes. Mr Taylor, whose house is as far from the office as Mr Baker, drives for 10 minutes to reach the same office. What is the difference in their driving speed?

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Unit 7: Speed

1. **550 m/min**
2. **1 m/s**
3. **6 km**
4. **1 m**
5. **60 km**
6. **2 cm**

	Time	Distance	Speed
7.	2 h	194 km	Speed = Distance ÷ Time = 194 ÷ 2 = **97 km/h**
8.	30 min	Distance = Speed × Time = 116 × 30 = **3480 m**	116 m/min
9.	Time = Distance ÷ Speed = 50 ÷ 10 = **5 s**	50 m	10 m/s
10.	60 h	1560 km	Speed = Distance ÷ Time = 1560 ÷ 60 = **26 km/h**
11.	Time = Distance ÷ Speed = 336 ÷ 8 = **42 min**	336 m	8 m/min
12.	2 s	Distance = Speed × Time = 14 × 2 = **28 cm**	14 cm/s
13.	19 h	988 km	Speed = Distance ÷ Time = 988 ÷ 19 = **52 km/h**
14.	Time = Distance ÷ Speed = 1829 ÷ 59 = **31 s**	1829 m	59 m/s
15.	67 min	Distance = Speed × Time = 99 × 67 = **6633 m**	99 m/min
16.	48 s	768 m	Speed = Distance ÷ Time = 768 ÷ 48 = **16 m/s**

17. **5 m/min**
    Total distance = 32 + 48 = 80 m
    Total time = 9 + 7 = 16 min
    Total distance ÷ Total time = 80 ÷ 16 = 5 m/min
18. **41 cm/s**
    Total distance = 372 + 243 = 615 cm
    Total time = 8 + 7 = 15 s
    Total distance ÷ Total time = 615 ÷ 15 = 41 cm/s
19. **17 km/min**
    Total distance = 150 + 630 + 240 = 1020 km
    Total time = 11 + 30 + 19 = 60 min
    Total distance ÷ Total time = 1020 ÷ 60 = 17 km/min
20. **32.5 m/min**
    Total distance = 461 + 239 + 1250 = 1950 m
    Total time = 18 + 7 + 35 = 60 min
    Total distance ÷ Total time = 1950 ÷ 60 = 32.5 m/min
21. **39 km/min**
    Total distance = 603 + 894 + 375 = 1872 km
    Total time = 21 + 18 + 9 = 48 min
    Total distance ÷ Total time = 1872 ÷ 48 = 39 km/min
22. **220 km**
    Distance = Speed × Time = 55 × 4 = 220 km
23. **6.5 h**
    Time = Distance ÷ Speed = 416 ÷ 64 = 6.5 h
24. **24.5 m/min**
    Speed = Distance ÷ Time = 580 ÷ 20 = 29 m/min
    $\frac{29 + 20}{2}$ = 24.5 m/min
25. **80 km/h**
    Speed = Distance ÷ Time = 120 ÷ $1\frac{1}{2}$ = 80 km/h
26. **360 km**
    Distance = Speed × Time = 75 × $4\frac{4}{5}$ = 360 km
27. **13 min**
    Time = Distance ÷ Speed = 96 ÷ 16 = 6 min
    Distance = Speed × Time = 12 × 18 = 216 km
    Average speed = Total distance ÷ Total time
    = (96 + 216) ÷ (6 + 18)
    = 312 ÷ 24
    = 13 min
28. **11 s**
    Time = Distance ÷ Speed = 2046 ÷ 186 = 11 s
29. **38 km**
    Distance = Speed × Time = 95 × $\frac{24}{60}$ = 38 km
30. **288 m**
    Total distance = Speed × Time
    = (8 × 12) + (12 × 16)
    = 96 + 192
    = 288 m
31. **227.5 km**
    Total distance = Speed × Time
    = $\left(60 \times 2\frac{2}{3}\right) + \left(45 \times 1\frac{1}{2}\right)$
    = 160 + 67.5
    = 227.5 km
32. Half an hour = $\frac{1}{2}$ × 60 = 30 min
    Speed = Distance ÷ Time = 540 ÷ 30 = 18 m/min
    Her average speed is **18 m/min**.
33. Time = Distance ÷ Speed = 396 ÷ 120 = $3\frac{3}{10}$ h
    $\frac{3}{10}$ × 60 = 18 min
    He will take 3 h 18 min to reach Kuala Lumpur.
    3 h 18 min from 10 45 is 14 03.
    He will reach Kuala Lumpur at **14 03**.
34. $\frac{15}{60} = \frac{1}{4}$ h
    Distance = Speed × Time = 82 × $\frac{1}{4}$ = 20.5 km
    The distance between Mr Baker's house and the office is 20.5 km.
    $\frac{10}{60} = \frac{1}{6}$ h
    Speed = Distance ÷ Time = 20.5 ÷ $\frac{1}{6}$ = 123 km/h
    Mr Taylor's driving speed is 123 km/h.
    123 – 82 = 41 km/h
    The difference in their driving speed is **41 km/h**.
35. Time = Distance ÷ Speed = 4 ÷ 4.8 = 0.83 × 60
    = 50 min
    Eileen took 50 min to complete a 4-km run.
    Time = Distance ÷ Speed = 4 ÷ 6 = 0.67 × 60
    = 40 min

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