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Learning MATHS 6A

Reviewed and recommended by Teachers and Parents

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NAME : _____

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Learning Maths Book 6A

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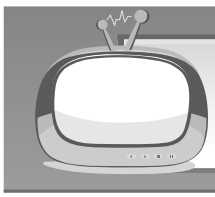
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PREFACE

Learning Maths Book 6A 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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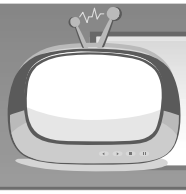
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LEARNING OUTCOMES

Unit 1 Algebra

Students should be able to

- use a letter to denote an unknown number
- simplify an algebraic expression
- solve an algebraic expression using the method of substitution
- solve word problems related to algebra

Unit 2 Angles

Students should be able to

- calculate unknown angles in geometric figures like square, rectangle, parallelogram, rhombus, trapezium and different types of triangles

Revision 1

This revision paper tests a student's understanding of Units 1 & 2.

Unit 3 Identifying Solids and Nets

Students should be able to

- identify different types of solids
- identify the faces of a cube, cuboid, prism and pyramid
- state the number of faces of a cube, cuboid, prism and pyramid
- identify the nets of a solid such as cube, cuboid, prism and pyramid
- recognise a solid based on its net

Unit 4 Fractions

Students should be able to

- perform four operations of fractions
- divide a whole number by a proper fraction
- divide a proper fraction by a proper fraction
- solve word problems related to fractions

Revision 2

This revision paper tests a student's understanding of Units 3 & 4.

Unit 5 Ratio

Students should be able to

- express a fraction as a ratio, and vice versa
- express two quantities as a fraction
- find the number of times one quantity is as large as another in terms of ratio, and vice versa
- compare ratios
- solve word problems related to ratios

Unit 6 Percentage

Students should be able to

- express a fraction as a percentage, and vice versa
- express a decimal as a percentage, and vice versa
- find the whole when a part and the percentage are given
- find a part when the whole and percentage of another part are given
- find percentage increase and decrease
- solve word problems related to percentage, discount, GST, percentage increase and percentage decrease

Revision 3

This revision paper tests a student's understanding of Units 5 & 6.

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 1 Algebra

Lower case letters are used to represent unknown numbers in algebra.
Example: Mr Johnson has x watches in his collection.

An **algebraic expression** includes a letter, an arithmetic operator and a number.

Examples: $x + 3$, $7 - b$, $5n$, $\frac{y}{9}$

Evaluating an algebraic expression

When the value of a letter is known, substitute it into the algebraic expression to get the answer.
Example: Find the value of $23z + 39$ when $z = 7$.

$$23z + 39 = 23 \times 7 + 39 = 200$$

Simplifying an algebraic expression

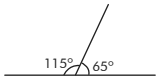
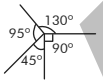
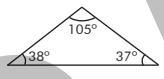
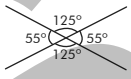
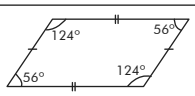
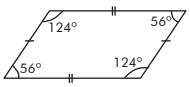
1. Group the algebra together.
   Bear in mind the arithmetic operators ($+$, $-$, $\times$, $\div$) in front of each variable. When the variable has to be moved, that arithmetic operator will follow.
2. Perform the arithmetic operation as usual.

Example: Simplify $6x + 20 + 3x - 15$.

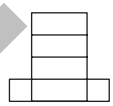
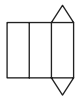
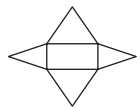
$$6x + 20 + 3x - 15 = 6x + 3x + 20 - 15 = 9x + 5$$

Unit 2 Angles

The properties of angles are summarised below.

Diagram	Property of angle
	The sum of angles on a straight line is 180°.
	The sum of angles at a point is 360°.
	The sum of angles in a triangle is 180°.
	Vertically opposite angles are equal.
	An isosceles triangle has two equal sides and two equal angles.
	An equilateral triangle has three equal sides and three equal angles.
	Angles between two parallel lines are 180°.
	Opposite angles are equal.

Unit 3 Identifying Solids and Nets

Solid	Number of faces	Shape(s) of face	Example of net
 cube	6	square	
 cuboid	6	rectangle	
 cuboid	6	square rectangle	
 prism	5	rectangle triangle	
 pyramid	4	triangle	
 pyramid	5	triangle square	
 pyramid	5	triangle rectangle	

Unit 4 Fractions

Adding fractions

1. Make sure denominators of all fractions are common.
2. Add the numerators.
3. Reduce to its simplest form if required.

Example: $\frac{2}{5} + \frac{1}{10} = \frac{4}{10} + \frac{1}{10} = \frac{5}{10} = \frac{1}{2}$

Subtracting fractions

1. Make sure denominators of all fractions are common.
2. Subtract the numerators.
3. Reduce to its simplest form if required.

Example: $\frac{1}{2} - \frac{3}{12} = \frac{6}{12} - \frac{3}{12} = \frac{3}{12} = \frac{1}{4}$

Multiplying fractions

1. Multiply both numerators.
2. Multiply both denominators.
3. Reduce to its simplest form if required.

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Alternatively, you may use the 'cancellation' method. When there is a common factor between numerator of one fraction and denominator of another, 'cancel' them by reducing both to their lowest factor.

Example: $\frac{\cancel{5}^{1}}{\cancel{12}_{4}} \times \frac{\cancel{3}^{1}}{\cancel{10}_{2}} = \frac{1 \times 1}{4 \times 2} = \frac{1}{8}$

Dividing a whole number by a proper fraction

1. Change the division sign (÷) to multiplication sign (×).
2. Find the reciprocal of the proper fraction by interchanging its numerator and denominator.
3. Multiply the numerators.
4. Multiply the denominators.
5. Reduce to its simplest form if required.

Example: $3 \div \frac{1}{2} = 3 \times \frac{2}{1} = \frac{6}{1} = 6$

Dividing a proper fraction by a proper fraction

1. Change the division sign (÷) to multiplication sign (×).
2. Find the reciprocal of the proper fraction on the right hand side by interchanging its numerator and denominator.
3. Multiply the numerators.
4. Multiply the denominators.
5. Reduce to its simplest form if required.

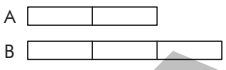
Example: $\frac{1}{4} \div \frac{1}{8} = \frac{1}{4} \times \frac{8}{1} = \frac{8}{4} = 2$

Unit 5 Ratio

Ratio and Fraction

We can express ratio as fraction.

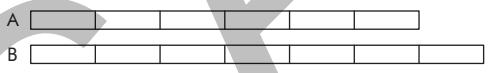
Example: When A is $\frac{2}{3}$ of B,



A : B
2 : 3

Similarly, we can express fraction as ratio.

Example: The ratio of A to B is 6 : 7.



A is $\frac{6}{7}$ of B and B is $\frac{7}{6}$ of A.

Comparing ratio

When one quantity in a ratio increases, the other quantity increases by the same multiplier. In order to find the unknown in a ratio, you have to find the multiplier.

Example:

	Y	:	Z	
5×	5	:	9	×5
	25	:	**45**	

Unit 6 Percentage

Percentage and Fraction

When expressing percentage as fraction,

1. denominator of the fraction must be 100,
2. reduce to its simplest form if required.

Example: Express 35% as a fraction.

$35\% = \frac{35}{100} = \frac{7}{20}$

When expressing fraction as percentage,

1. make the denominator of the fraction to 100,
2. multiply the numerator of the fraction by the same multiplier.

Example: Express $\frac{6}{20}$ as a percentage.

$\frac{6 \times 5}{20 \times 5} = \frac{30}{100} = 30\%$

Percentage and Decimal

When expressing decimal as percentage, multiply the decimal by 100%.

Example: Express 0.16 as a percentage.

$0.16 = 0.16 \times 100\% = 16\%$

When expressing percentage as decimal, divide the percentage by 100%.

Example: Express 89% as a decimal.

$89\% = 89 \div 100 = 0.89$

Percentage increase

Amount of increase = increased amount – original amount

$\text{Amount of increase} = \frac{\text{increase (in \%)}}{100\%} \times \text{original amount}$

$\text{Percentage increase} = \frac{\text{amount of increase}}{\text{original amount}} \times 100\%$

Percentage decrease

Amount of decrease = original amount – decreased amount

$\text{Amount of decrease} = \frac{\text{decrease (in \%)}}{100\%} \times \text{original amount}$

$\text{Percentage decrease} = \frac{\text{amount of decrease}}{\text{original amount}} \times 100\%$

Discount

Amount of discount = usual price – selling price

$\text{Amount of discount} = \frac{\text{discount (in \%)}}{100\%} \times \text{original amount}$

$\text{Percentage discount} = \frac{\text{amount of discount}}{\text{original amount}} \times 100\%$

GST

Amount of GST = final price – price before GST

$\text{Amount of GST} = \frac{\text{GST (in \%)}}{100\%} \times \text{price before GST}$

$\text{GST percentage} = \frac{\text{amount of GST}}{\text{price before GST}} \times 100\%$

Interest

Amount of interest = amount with profit – principal amount

$\text{Amount of interest} = \frac{\text{interest (in \%)}}{100\%} \times \text{principal amount}$

$\text{Interest percentage} = \frac{\text{amount of interest}}{\text{principal amount}} \times 100\%$

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1 ALGEBRA

Examples

1. State an algebraic expression for a is more than 28.

   $a + 28$

2. Simplify $7s + 19 + 4s - 6$.

   $7s + 19 + 4s - 6 = 7s + 4s + 19 - 6$
   $= \mathbf{11s + 13}$

3. There were p children and four times as many parents as children at a book fair. If $p = 55$, how many people were at the book fair?

   Number of parents $= 4 \times p = 4p$
   Number of people $= p + 4p = 5p$
   $5p = 5 \times 55 = 275$
   275 people were at the book fair.

Give an expression for each of the following. Write your answers on the lines provided.

1. Mrs Gibson bought x pencils. She distributed the pencils among 40 students. How many pencils did each student receive?

   _____

2. Jessica buys 10 similar dresses. Each dress costs $\$y$. How much must she pay in all?

   _____

3. Alan was m years old 2 years ago. How old will he be this year?

   _____

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4. Sue bought z apples. She gave 5 apples to her friends. How many apples had she left?

_____

5. Mindy obtained 88 marks in her English test. Sandy obtained x marks in the same test. What was their average marks?

_____

6. Gordon has n stamps. Mike has twice as many stamps as Gordon. Kenny has thrice as many stamps as Mike. How many stamps does Kenny have?

_____

7. Belinda had \$50. She gave half of the money to her sister. Her mother gave Belinda \$$a$. How much money did Belinda have in the end?

_____

8. Joy has x balloons. Maggie has y balloons. Helen has z balloons. How many balloons do they have in all?

_____

9. Nancy baked z cakes. She gave 5 cakes to her neighbours and 12 cakes to her relatives. How many cakes had she left?

_____

10. Felicia's car consumed x litres of petrol on Monday. It consumed twice the amount of petrol on Tuesday. How much petrol was left if Felicia pumped 50 litres of petrol before Monday?

_____

Evaluate the following algebraic expressions when $y = 6$.

11. $1 + y + 9 =$ _____

12. $y - 3 + 2 =$ _____

13. $y + y + y =$ _____

14. $2y =$ _____

15. $y^2 =$ _____

16. $\frac{y}{2} =$ _____

17. $3y + 2y =$ _____

18. $8y \div 12 =$ _____

19. $3y + 4y - 3 =$ _____

20. $10y - 4y + 21 - 13 =$ _____

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Simplify the following algebraic expressions.

21. $a + a + 2a =$ _____

22. $5b - 3b + 6b =$ _____

23. $3c + 2c - 4c =$ _____

24. $6d - d - 2d =$ _____

25. $4 + 2e + 5 =$ _____

26. $9 + 5 + f + 4f =$ _____

27. $4g - 2g - 3 =$ _____

28. $7h + 4 - 5h - h =$ _____

29. $3x - 6 - x =$ _____

30. $10 + 10k + 3 + 14k =$ _____

Write your answers on the lines provided.

31. $18a = 6 \times$ ☐. What is the missing value? _____

32. Ally bought 10 books which cost $\$2m$ each. If she gave the cashier a fifty-dollar note, how much change would she receive?

_____

33. If $b = 12$, find the perimeter of a rectangle of length $3b$ cm and breadth 10 cm.

_____

34. The length of a square is $7a$ cm. Find its area if $a = 2$.

_____

35. If $a = 7$ and $b = 10$, find the value of $a + 3b \times 2 - b$. _____

36. If $14a = 84$, what will $a + 10$ be? _____

37. Find the value of $4x - 2x$ if $x = 3$. _____

38. $\frac{1}{2}$ of $n = 14$. What is n? _____

39. Subtract $3k$ from the product of 9 and $2k$. What is the answer?

_____

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40. Theresa had $\$(10y + 6)$. She bought a dress which cost $\$3y$ and a pair of shoes which cost twice as much as the dress. How much money had Theresa left?

_____

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

41. The parking charges at a shopping centre was \$2 for the first hour and $\$d$ for every subsequent hour or part thereof. Calvin parked his car at the shopping centre from 2.30 pm to 5.10 pm. How much did he have to pay for the parking charges? Express your answer in terms of d.

42. Jennifer has 80 sweets and Wendy has x sweets fewer than Jennifer.
    (a) How many sweets must Jennifer give to Wendy so that both will have an equal number of sweets? Express your answer in terms of x.
    (b) If $x = 40$, how many sweets do they have altogether?

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43. Fred, Joyce and Darren received some marbles in the ratio 6 : 5 : 3. If Fred received 18y marbles,

    (a) find the number of marbles Joyce received in terms of y.

    (b) find the total number of marbles the three children had in terms of y.



44. A rectangular tank 18 cm long and 12 cm wide was filled with water to a height of y cm. The water level increased to 10 cm when some marbles were placed into the tank.

    (a) What was the increase in the water level in terms of y?

    (b) If $y = 8$ cm, find the increase in volume of water after the marbles were placed into the tank.

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SOLUTIONS
Learning Maths 6A

Unit 1: Algebra

1. $\frac{x}{40}$ **pencils**
   $x \div 40 = \frac{x}{40}$
2. **$10y**
   $10 \times \$y = \$10y$
3. **(*m* + 2) years old**
4. **(*z* – 5) apples**
5. $\left(44 + \frac{x}{2}\right)$ **marks**
   $\frac{88 + x}{2} = \left(44 + \frac{x}{2}\right)$
6. **9*n* stamps**
   Mike: $2 \times n = 2n$
   Kenny: $3 \times 2n = 6n$
   $n + 2n + 6n = 9n$
7. **$(25 + *a*)**
   Amount of money Belinda gave to her sister
   $= \$50 \div 2 = \$25$
   Amount of money Belinda had left
   $= \$50 - \$25 = \$25$
   $\$25 + a = \$(25 + a)$
8. **(*x* + *y* + *z*) balloons**
9. **(*z* – 17) cakes**
   $5 + 12 = 17$
   $z - 17$
10. **50 – 3*x* litres of petrol**
    $x + 2x = 3x$
    $50 - 3x = (50 - 3x)$
11. **16**
    $1 + 6 + 9 = 16$
12. **5**
    $6 - 3 + 2 = 5$
13. **18**
    $6 + 6 + 6 = 18$
14. **12**
    $2 \times 6 = 12$
15. **36**
    $6 \times 6 = 36$
16. **3**
    $6 \div 2 = 3$
17. **30**
    $(3 \times 6) + (2 \times 6) = 18 + 12 = 30$
18. **4**
    $(8 \times 6) \div 12 = 48 \div 12 = 4$
19. **39**
    $(3 \times 6) + (4 \times 6) - 3 = 18 + 24 - 3 = 39$
20. **44**
    $(10 \times 6) - (4 \times 6) + 21 - 13 = 60 - 24 + 21 - 13 = 44$
21. **4*a***
    $a + a + 2a = 4a$
22. **8*b***
    $5b - 3b + 6b = 2b + 6b = 8b$
23. ***c***
    $3c + 2c - 4c = 5c - 4c = c$
24. **3*d***
    $6d - d - 2d = 5d - 2d = 3d$
25. **9 + 2*e***
    $4 + 5 + 2e = 9 + 2e$
26. **14 + 5*f***
    $9 + 5 + f + 4f = 14 + 5f$
27. **2*g* – 3**
    $4g - 2g - 3 = 2g - 3$
28. ***h* + 4**
    $7h - 5h - h + 4 = h + 4$
29. **2*x* – 6**
    $3x - x - 6 = 2x - 6$
30. **13 + 24*k***
    $10 + 3 + 10k + 14k = 13 + 24k$
31. **3*a***
    $18a \div 6 = 3a$
32. **$(50 – 20*m*)**
    $10 \times \$2m = \$20m$
    $\$50 - \$20m = \$(50 - 20m)$
33. **92 cm**
    $3b + 10 + 3b + 10 = (3 \times 12) + 10 + (3 \times 12) + 10$
    $= 36 + 10 + 36 + 10$
    $= 92$
34. **196 cm²**
    $7 \times 2 = 14$ cm
    $14 \times 14 = 196$ cm²
35. **57**
    $a + 3b \times 2 - b = 7 + (3 \times 10) \times 2 - 10 = 57$
36. **16**
    $14a = 84$
    $a = 84 \div 14 = 6$
    $6 + 10 = 16$
37. **6**
    $(4 \times 3) - (2 \times 3) = 12 - 6 = 6$
38. **28**
    $\frac{1}{2} \times n = 14$
    $n = 14 \times 2 = 28$
39. **15*k***
    $9 \times 2k = 18k$
    $18k - 3k = 15k$
40. **$(*y* + 6)**
    Shoes: $2 \times \$3y = \$6y$
    $\$3y + \$6y = \$9y$
    $\$(10y + 6) - \$9y = \$10y - \$9y + \$6$
    $= \$(y + \$6)$
41. From 2.30 pm to 3.30 pm = \$2
    From 3.30 pm to 4.30 pm = $d
    From 4.30 pm to 5.10 pm = $d

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