80 USEFUL TRICKS TO SOLVE MATH PROBLEMS EASILY

For P1 - P6

www.jimmymaths.com

About the Author

Jimmy Ling graduated from NUS with a degree in Applied Mathematics and has been teaching Mathematics after graduation.

He is the co-founder and director of Grade Solution Learning Centre, a leading tuition centre in Singapore with more than 1000+ students enrolled monthly.

He is also the founder and director of Jimmy Maths, which has more than 10,000 students learning Math online through our online courses.

He is the author of the following books:

- Your Complete Guide to Math Concepts

- 80 Useful Tricks to Solve Math Problems Easily

- PSLE Maths Specimen Papers (You can buy this in Popular bookstores)

- Math Revision Notes for Secondary Students

- Real-World Applications of Math Concepts

He was featured on Love 972 and Straits Times to give tips in doing well for Math.

His YouTube channel which shares Math videos regularly has more than 2k subscribers. You can watch his videos here >>
https://www.youtube.com/channel/UC5RoF52CtQLYH_W8iX1FrwQ

Foreword

Dear Parents,

Does your child always struggle with problem sums?

Is your child always leaving them blank, not knowing how to start solving them?

Or does he have problems expressing the problem in the right mathematical statements?

Many parents thought that their child may have problems understanding the question.

However, the underlying problem is deeper than that.

If you think about it, the language used in Primary School Math are not that tough.

We don't see bombastic words or fancy phrases.

Instead, we see straightforward statements like

"John has 20 more apples than Mary,"

"He gave $\frac{1}{3}$ of his apples to Mary,"

"They had equal number of fruits in the end" etc…

If your child read the question slowly and carefully, he will probably knows what the question mean.

But…

The Trick Lies in Expressing These Simple Word Statements into the Right Mathematical Statement or Models

If your child have problems expressing them in the right mathematical statements or models…

He will get lost on how to start solving the question.

He will now know which method to apply to solve the problem.

He may even started off wrongly and end up wasting precious time in the exams….

Well, I got good news for you.

In this book, we have compiled 80 useful tricks on how to express problem sums in the right mathematical statements or models easily.

By spotting the right keywords, your child will know exactly how to express them properly, and link to the right concept.

This will enable your child to kick-start his thinking in the right direction.

Your child can keep this book as a useful companion when solving Math problems.

You will be surprised at how useful these tricks are.

But…

Be Warned!

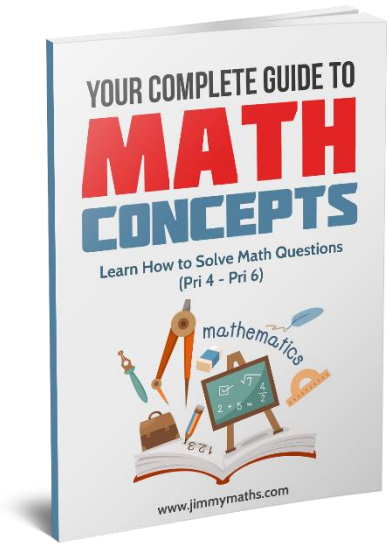
These tricks are not a replacement of UNDERSTANDING CONCEPTS.

They are simple tools which your child can use to start solving correctly.

Your child still has to understand the concept which the question is testing on, and how to apply it correctly.

To have a clear understanding of the common problem sum concepts in Paper 2, make sure you download our other eBook, "Your Complete Guide to Math Concepts."

See next page for the download link.



If you have not downloaded this book, click here to download now >>
https://jimmymaths.com/free-materials

With understanding of concepts, these 80 tricks will help you and your child to:

- Identify Math Concepts
- Start Solving Fast and Accurately
- Save Time in Exams
- Eliminate Careless Mistakes
- Make Learning Math More Fun!

If you have any feedback about this book, feel free to email us.

We look forward to hearing how useful these tricks are in helping your child to solve Math problems.

Have fun learning!

How Your Child Can Improve in Math

Many parents have approached me to coach their child.

If your child needs help too, feel free to enrol in my online courses or any of our tuition classes. (Sorry, I don't do one-to-one tuition)

Here are a few things to note:

- We don't let your child practice any questions first before understanding the concept. We simplify concepts in ways which your child can understand first.

- We don't do drilling of problem sums. Instead, we classify questions carefully to their heuristic or concepts, and let your child master each of them. We will also do revision constantly to revise the concepts again.

- We don't teach students to stick to one method of solving problem sums. We will teach a variety of methods so that your child has more tools to use during exams.

Here are 2 ways which you can seek help from us…

Does your child need help in his or her studies?

1) Live Online Lessons at Grade Solution Learning Centre

At Grade Solution Learning Centre, we are a team of dedicated educators whose mission is to guide your child to academic success. Here are the services we provide:

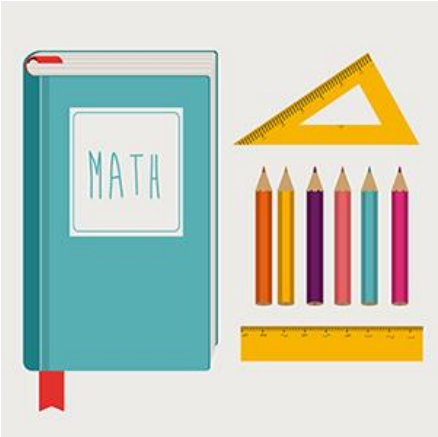
- Live Online Lessons
- EdaptIQ™, a smart learning platform that tracks your child's progress, strengths and weaknesses through personalised digital worksheets.
- 24/7 Homework Helper Service
- Unlimited Marking with detailed feedback

We provide all these services above at a very affordable monthly fee to allow as many students as possible to access such learning opportunities.

We specialise in English, Math, and Science subjects.

You can see our fees and schedules here >> https://gradesolution.com.sg/schedule/

2) Pre-recorded Online courses on Jimmymaths.com



If you are looking for something that fits your budget, or prefer your child learn at his or her own pace, you can join our pre-recorded online Math courses.

Your child can:

- Learn from recorded videos
- Get access to lots of common exam questions to ensure sufficient practice
- Get unlimited support and homework help

You can see the available courses here >>

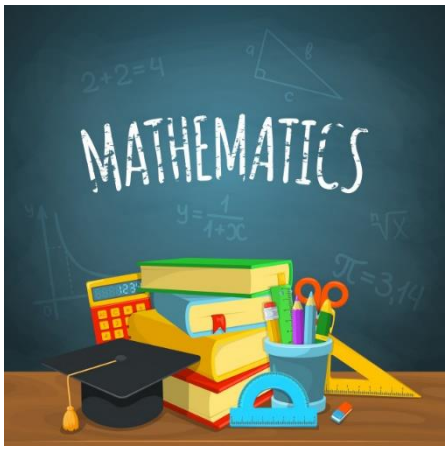
https://jimmymaths.com/our-courses/

Number

1. X more than Y is Z.

   X + Y = Z

   Eg. 23 more than 5 is __28__.



2. X is Y more than Z.

   X = Y + Z

   Eg. __28__ is 5 more than 23.

3. X less than Y is Z.

   Y – X = Z

   Eg. 23 less than 28 is __5__.

4. X is Y less than Z

   X = Z – Y

   Eg. __23__ is 5 less than 28.

5. Multiplication and division before addition and subtraction

   Eg. $\underline{2 + 3} \times 5 = 5 \times 5$

   $= 25$ (Wrong!)

   $2 + \underline{3 \times 5} = 2 + 15$ (Always underline the part which you want to do first)

   $= 17$ (Correct!)

6. Work out sums in brackets before multiplication and division.

   Eg. $2 \times \underline{(3 + 5)} = 2 \times 8$

   $= 16$

7. Remember **BODMAS rule**

   B for Bracket

   O for Order (or Power Of)

   D for Division

   M for Multiplication

   A for Addition

   S for Subtraction

8. Identify **Place**: Think of Words

   Eg. 143.67

   Place of '1': hundreds

   Place of '6': tenths

9. Identify **Value**: Think of Number

   Eg. 143.67

   Value of '4': 40

   Value of '7': 0.07

10. To multiply by 10, 100, 1000 → simply add zeros to the back.

    Eg. $52 \times 10 = 520$

    $170 \times 100 = 17\,000$

11. To divide by 10, 100, 1000 → simply remove zeros from the back.

    Eg. $500 \div 10 = 50$

    $73000 \div 1000 = 73$

12. To multiply by a multiple of 10, 100 or 1000, split the numbers up.

Eg. $7 \times 300 = \underline{7 \times 3} \times 100 = 21 \times 100 = 2100$

13. To divide by a multiple of 10, 100, 1000, split the numbers up.

Eg. $4800 \div 40 = \underline{4800 \div 4} \div 10 = 1200 \div 10 = 120$

14. To cut a Model into 5 parts, you need 4 cuts

Number of Cuts = Number of Parts – 1

15. There are 4 gaps between 5 trees.

Number of Gaps = Number of Trees – 1

Gap Gap Gap Gap

Fraction

16. Fraction multiply by number → express the number as a fraction

Eg. $\frac{3}{5}\times 2=\frac{3}{5}\times\frac{2}{1}$ (Multiply Numerator with Numerator)

$=\frac{6}{5}$

$=1\frac{1}{5}$ (Always leave your answer in mixed number)

17. Fraction ÷ by number → multiply by 1 ÷ number

Eg. $\frac{4}{5}\div 8=\frac{^{1}\cancel{4}}{5}\times\frac{1}{\cancel{8}_{2}}$ (Cancel Numerator with Denominator)

$=\frac{1}{10}$

18. Fraction multiply by fraction

Eg. $\frac{^{1}\cancel{2}}{5}\times\frac{3}{\cancel{8}_{4}}=\frac{3}{20}$ (Cancel Numerator with Denominator)

19. Fraction divide by fraction → Flip the 2nd Fraction

Eg. $\frac{1}{3}\div\frac{2}{5}=\frac{1}{3}\times\frac{5}{2}$

$=\frac{5}{6}$

20. How many sixths are there in a fraction? (sixth = $\frac{1}{6}$)

Change denominator to match question.

$\frac{2}{3}=\frac{4}{6}$ → 4 sixths

21. To compare fractions with **same denominator,**

"Bigger numerator → Bigger fraction"

Ascending order: $\frac{1}{7}$, $\frac{2}{7}$, $\frac{4}{7}$

22. To compare fractions with **same numerator**,

"Bigger denominator → Smaller fraction"

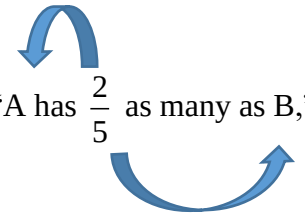
Descending order: $\frac{1}{5}$, $\frac{1}{8}$, $\frac{1}{9}$

23. When you see "Fraction of", it means "Fraction Times"

Eg. Find $\frac{1}{3}$ of 81

$\frac{1}{3} \times 81 = 27$

24. When you see, "A has $\frac{2}{5}$ as many as B," point the arrows correctly.



A: 2 units

B: 5 units

25. A has $\frac{1}{3}$ more than B

A: 3 + 1 = 4 units

B: 3 units

26. A has $\frac{2}{7}$ less than B

A: 7 – 2 = 5 units

B: 7 units

27. A is 20 more than $\frac{1}{2}$ of B

A: 1 unit + 20

B: 2 units

28. A is 10 less than $\frac{1}{3}$ of B

A: 1 unit – 10

B: 3 units

29. John spent / lost $\frac{2}{3}$ of his money

Original: 3 units

Spend / lose: 2 units

Left: 1 unit

30. John received / added $\frac{2}{5}$ of his money

Original: 5 units

Receive / add: 2 units

New: 7 units

31. When the question says, "$\frac{2}{3}$ of A is equal to $\frac{1}{5}$ of B," to find the ratio of A : B…

1st Step: $\frac{2}{3}A = \frac{2}{10}B$ (Make Numerator Equal)

2nd Step: Compare their denominator

A: 3 units

B: 10 units

32. When the question says, "$\frac{1}{3}$ of A is equal to 3 times of $\frac{1}{5}$ of B", to find the ratio of A : B….

1st Step: $\frac{1}{3}A$ $\frac{1}{5}B$

2nd Step: $\frac{3}{9}A$ $\frac{1}{5}B$ (Make numerator of A three times of B)

3rd Step: Compare their denominator

A: 9 units

B: 5 units

33. When the question says, "After using $\frac{1}{4}$ of A and $\frac{3}{4}$ of B, leftover of A is equal to leftover of B", to find the ratio at first…

1st Step: $\frac{3}{4}A$ $\frac{1}{4}B$ (Find the leftover for A and B)

2nd Step: $\frac{3}{4}A$ $\frac{3}{12}B$ (Make the numerators equal)

3rd Step:

(Original)	A: 4 units	B: 12 units
(Used)	A: 1 unit	B: 9 units
(Left)	A: 3 units	B: 3 units

34. Be careful when the question says, "Fraction of Total"…

Eg. John spend $\frac{1}{3}$ of his money on Item A and $\frac{1}{2}$ of his money on Item B.

$\frac{1}{3}+\frac{1}{2}=\frac{5}{6}$ (Fraction of money spent)

$1-\frac{5}{6}=\frac{1}{6}$ (Fraction of money left)

35. Be even more careful when the question says, "Fraction of Remainder"…

When you see the word "Remainder", you can use "Branching".

Eg. John spend $\frac{1}{3}$ of his money on Item A and $\frac{1}{2}$ of the **<u>remainder</u>** on Item B. If Item B is $30, find the total.

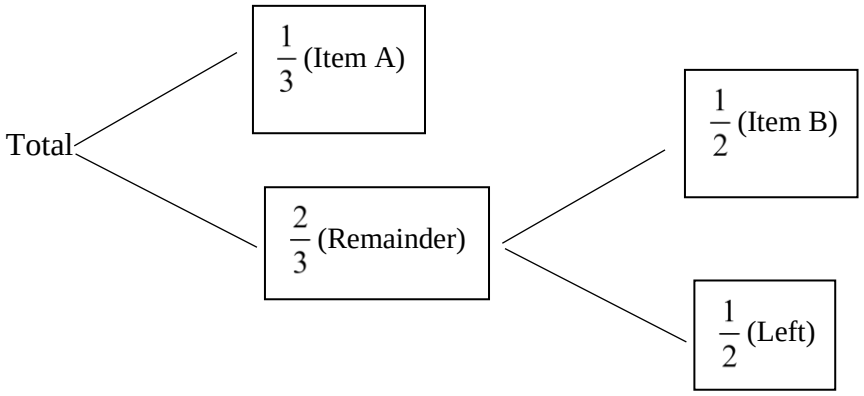
Note: fractions on the same branch should add up to 1

Item B = $30

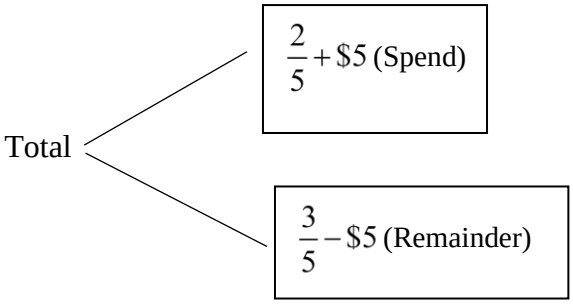
$30 × 2 = $60 (Remainder)

Item A = $60 ÷ 2 = $30

Total = $30 × 3 = $90

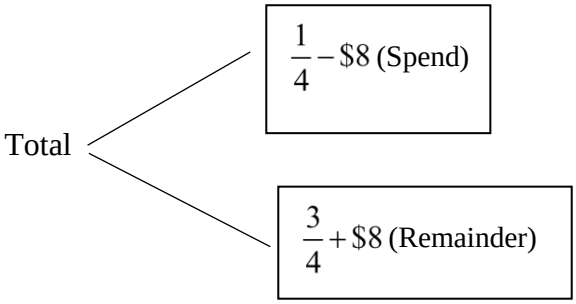


36. When the question says, "John spent \$5 more than $\frac{2}{5}$ of his money," you can draw the branching like this:



Note: Fractions should add up to 1
Signs should be opposite
Numbers should be the same

37. When the question says, "John spent \$8 less than $\frac{1}{4}$ of his money," you can draw the branching like this:



Note: Fractions should add up to 1
Signs should be opposite
Numbers should be the same

38. Be careful of what the question is asking for.

Is the question asking for "Fraction of Total" or "Fraction of Remainder"?

Eg. $\frac{1}{6}$ of a pizza is eaten and the remainder is cut into 10 pieces, what **fraction of the pizza** is one piece?

Left → $1-\frac{1}{6}=\frac{5}{6}$

1 piece → $\frac{5}{6}\div 10=\frac{5}{6}\times\frac{1}{10}$

$=\frac{1}{12}$

Ratio

39. When the question says, "$\frac{1}{3}$ are girls, and the rest are boys," express the ratio like this:

G	:	B	:	Total
1	:	2	:	3

40. There are twice as many girls as boys.

G	:	B	:	Total
2	:	1	:	3

41. 30% are women, and the rest are men.

W	:	M	:	Total
30	:	70	:	100
3	:	7	:	10

42. When **only 1 part changed**, apply the **Constant Part Concept**.

Eg. Original ratio of A : B is 4 : 3. A loses 7. End ratio of A : B becomes 1 : 1.

Make B the same.

1 unit = 7

A	:	B
4	:	3
↓ −7		
1	:	1
3	:	3

43. When there is **internal transfer**, apply the **Constant Total Concept**.

Eg. Original ratio of A : B is 2 : 1. A gives B 30. End ratio of A : B becomes 1 : 1.

Make the total the same.

1 unit = 30

A	:	B	:	Total
2	:	1	:	3
4	:	2	:	6
↓ −30		↓ +30		
1	:	1	:	2
3	:	3	:	6

44. When you see questions involving **age**, the age **difference remains the same**.

Eg. Original ratio of age of A : B is 3 : 2. 15 years ago, ratio of age of A : B becomes 5 : 3.

Make the difference the same.

1 unit = 15 years

A	:	B	:	Difference
3	:	2	:	1
6	:	4	:	2
↓ –15		↓ –15		
5	:	3	:	2

45. When both sides of the ratio increase/decrease by the same amount, the difference remains unchanged.

Eg. Original ratio of A : B is 7 : 3. After both spend $300, ratio of age of A : B becomes 3 : 1.

Make the difference the same.

1 unit = $300

A	:	B	:	Difference
7	:	3	:	4
↓ –300		↓ –300		
3	:	1	:	2
6	:	2	:	4

46. When everything changed, use units and parts.

Eg. Original ratio of A : B is 2 : 1. A received 50, B received 40. Ratio becomes 3 : 2.

A: 2u + 50 = 3p

B: 1u + 40 = 2p

2u + 80 = 4p

3p – 50 = 4p – 80

1p = 80 – 50

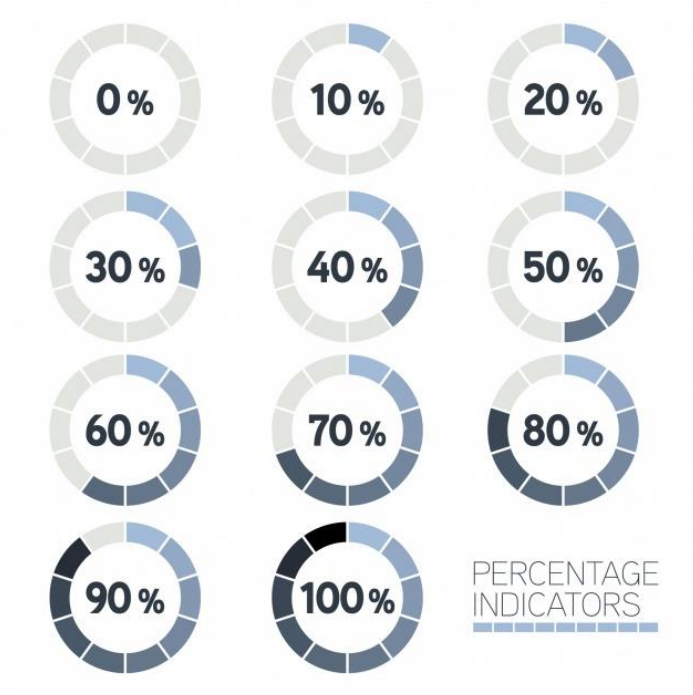
= 30

A	:	B	:	
2	:	1	:	units
↓ +50		↓ +40		
3	:	2	:	parts

Percentage

47. 20% of A = $\frac{20}{100} \times A$

Eg. 20% of 5 = $\frac{20}{100} \times 5 = 1$



48. When you see "A has 10% as much as B," write the ratio like this:

A	:	B
10	:	100
1	:	10

49. A has 30% more than B

A	:	B
130	:	100
13	:	10

50. A has 20% less than B

A	:	B
80	:	100
4	:	5

51. When there is a 20% discount, you only need to pay 80% of the price.

Original: 100%

Discount: 20%

Pay: 80%

Eg. $250 with discount 20%

After discount, paid = $\frac{80}{100} \times 250 = 200$

52. When you see "5% interest per year", the money will increase by 5% every year.

Original: 100%

Interest per year: 5%

Number of years = 2

Eg. Borrow $500 for 2 years at 5% interest per year

$\frac{110}{100} \times \$500 = \$550$

53. When you see "GST 9%", you need to pay 109% of the price.

Original: 100%

GST: 9%

Total: 109%

Eg. $1500 before 9% GST,

Total with GST = $\frac{109}{100} \times \$1500 = \$1635$

54. Always let the original number be 100%.

Eg. After an increase of 20%, a number becomes 600. Find the original number.

120% → 600

1% → 5

100% → 500

55. To find percentage increase or decrease, here is how you do it.

$$\text{Percentage change} = \frac{\text{New} - \text{Original}}{\text{Original}} \times 100\%$$

Eg. Original: 50

New Number: 70

$$\text{Percentage change} = \frac{70 - 50}{50} \times 100\%$$

$$= 40\%$$

56. To convert percentage to decimal, write it as a fraction over 100.

Eg. $80\% = \frac{80}{100} = 0.8$

57. To convert decimal to percentage, write it as a fraction over 100 or move the decimal place to the right twice.

Eg. $0.75 = \frac{75}{100} = 75\%$

58. Remember this!

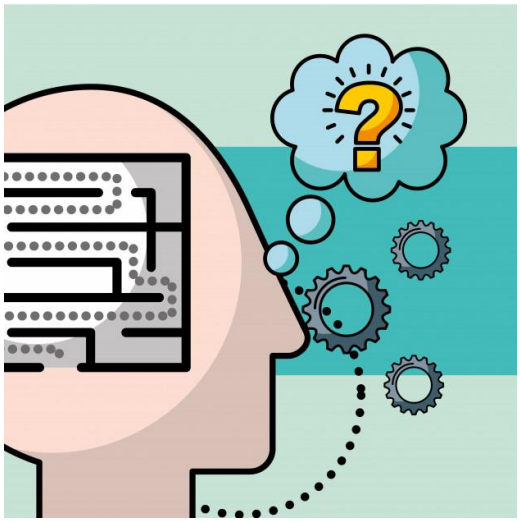
$1 = 100\%$

$\frac{1}{2} = \frac{50}{100} = 50\%$

$\frac{1}{4} = \frac{25}{100} = 25\%$

$\frac{1}{5} = \frac{20}{100} = 20\%$

$\frac{1}{8} = \frac{125}{1000} = 12.5\%$



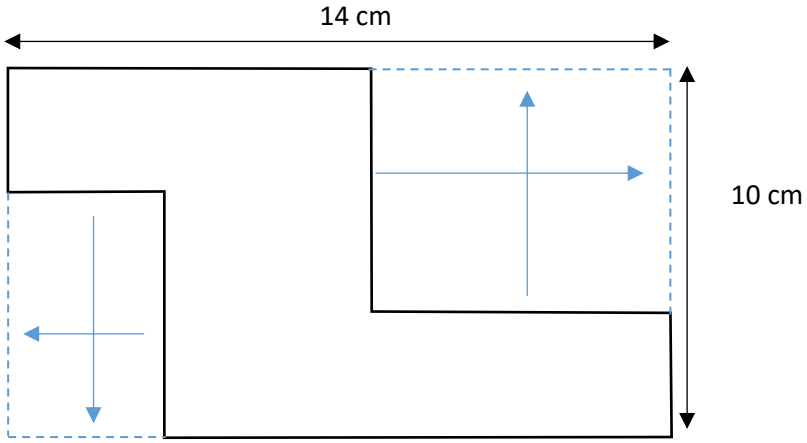
Measurement

59. To find the perimeter of such figures, push out the parts to form a rectangle.

Eg. Perimeter

= 2 × 14 cm + 2 × 10 cm

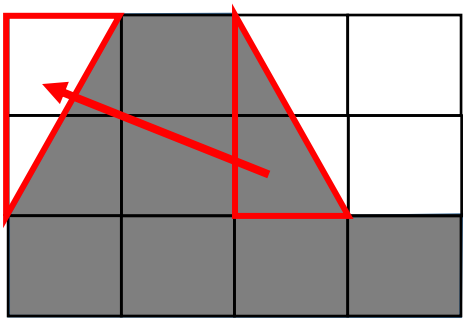
= 48 cm



60. To find area of such figures, you can cut and paste various parts.

Eg. One square has a length 5 cm.

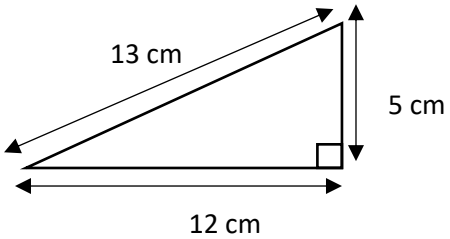
Area = 8 × 5 cm × 5 cm = 200 cm^2



61. For triangles, area = $\frac{1}{2} \times base \times height$. To identify base and height, they must be **perpendicular** to each other.

Eg. Find the area of the given triangle.

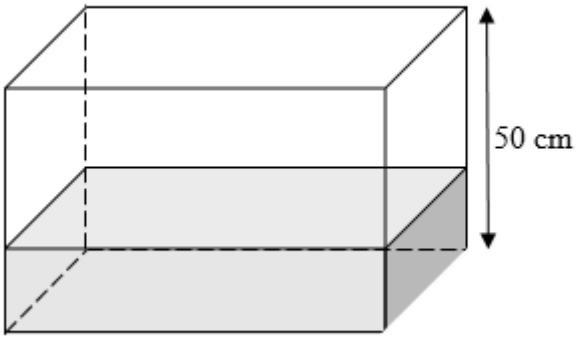
Area = $\frac{1}{2} \times 12cm \times 5cm = 30\ cm^2$



62. Remember this:

"Fraction of container filled = Fraction of height of water level"

Eg. For a container that has a height of 50 cm, if it is $\frac{2}{5}$ filled, the height of the water level is $\frac{2}{5} \times 50cm = 20$ cm.



63. When you see "Pour water from container A to container B until their **<u>water level are the same</u>**," remember this:

"Height of Water Level = Total Volume ÷ Combined Base Area"

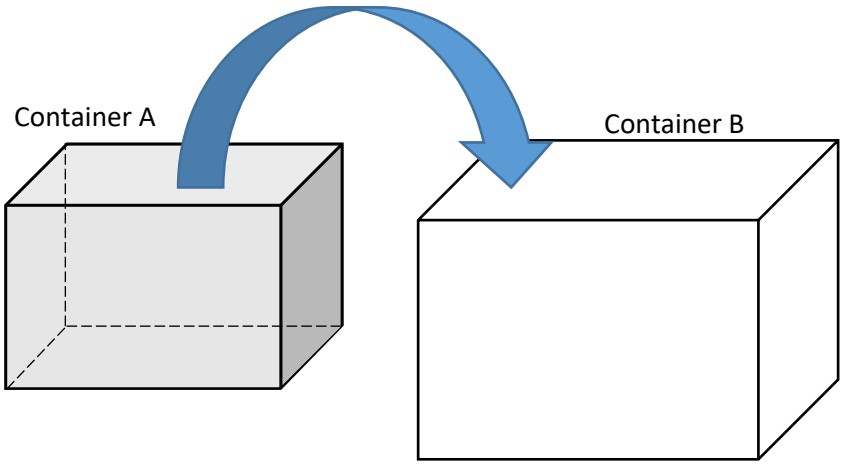
Eg. Total volume of water in container A: 20 ℓ

Base area of container A: 400 cm^2

Base area of container B: 600 cm^2

Pour water from A to B such that the height of the water level are the same

Height = 20000 cm^3 ÷ (400 cm^2 + 600 cm^2) = 20 cm

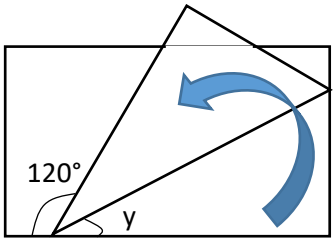


Geometry

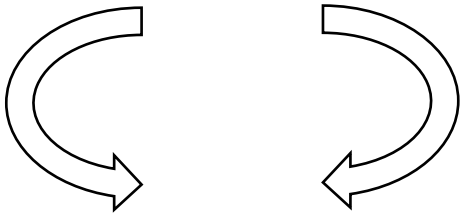
64. For folded angles, identify which angle is folded and repeated.

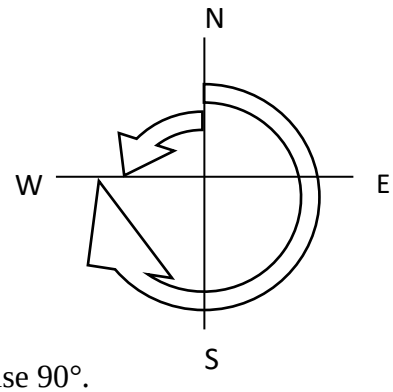
Eg. To find angle y, 180° – 120° = 60°

60° ÷ 2 = 30°



65. Counter clockwise VS clockwise turning





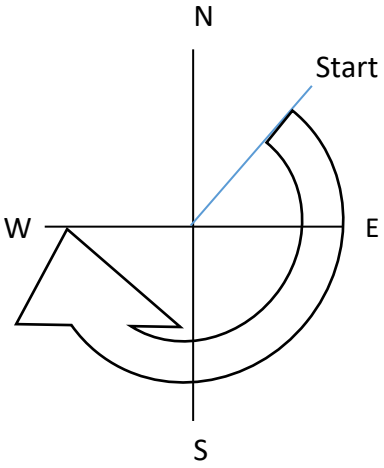
To turn clockwise 270° is the same as to turn counter clockwise 90°.

66. 1 right angle turn = 90°

$\frac{1}{2}$ right angle turn = 45°

Eg. 225° = 180° + 45°

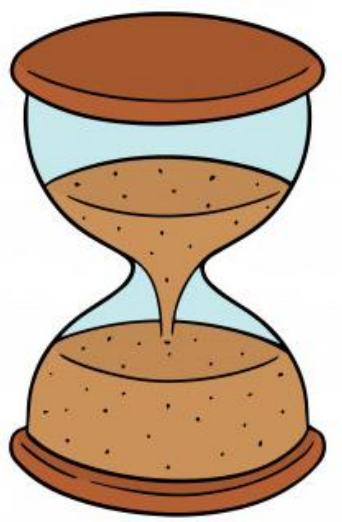
225° clockwise turn



Rate and Speed

67. When one increases, the other increases as well.

    Eg. 6 girls can bake 20 cookies.
    12 girls can bake 20 × 2 = 40 cookies



68. When one increases, the other decreases.

    Eg. 5 men can build a house in 30 days.
    10 men can build the same house in 30 ÷ 2 = 15 days.

69. Tap can fill a tank in X min → rate = $\frac{1}{X}$ tank/min

    If rate = $\frac{5}{6}$ tank/min, time taken to fill the tank = $\frac{6}{5}$
    = 1.2 min

70. Distance = speed × time

    Be Careful of their units!

    Eg. Mary ran 0.5 km at 0.5 m/s, how long did she take? Leave your answer in minutes and seconds.

    500 m ÷ 0.5 m/s = 1000 s
    = 16 mins 40 s

71. Average speed = total distance ÷ total time

    Eg. Michael drove 50 km at 25 km/h and another 60 km at 30 km/h, find his average speed.

    50 ÷ 25 = 2

    60 ÷ 30 = 2

    (50 + 60) ÷ (2 + 2) = 110 ÷ 4
    = 27.5 km/h

72. For 2 objects going towards each other, remember this:

"Time taken to meet = Total distance ÷ Total speed"

Eg. Henry left Town A towards Town B at 60 km/h. Julie left Town B for Town A at 80 km/h. If the total distance between the two towns is 280 km, how long did they take to meet?

280 ÷ (60 + 80) = 280 ÷ 140 = 2 hours

73. For "catching up" questions, remember this:

"Time taken to catch up = Distance apart ÷ Difference in speed"

Eg. Jacky is 100 km in front of his mother. His mother was driving at 110 km/h while Jacky was driving at 90 km/h. How long would his mother take to catch up with him?

100 ÷ (110 – 90) = 100 ÷ 20 = 5 hours

Algebra

74. When including units for algebra, use brackets to show that units apply to both the algebra and the number.

Eg. $(3x-7)\,\text{cm}$

75. When it comes to Subtraction, **the order matters**!

Eg. Subtract 2 from a

Ans: $2 - a$ (Wrong!)

Ans: $a - 2$ (Correct!)

76. For multiplication, write the number in front of the algebra.

Eg. 4 multiply by k → $4k$

77. For division, write it as a fraction.

Eg. Divide 4m by 7 → $\frac{4m}{7}$

78. Follow the BODMAS rule when it comes to algebra as well (brackets before multiplication and division before addition and subtraction)

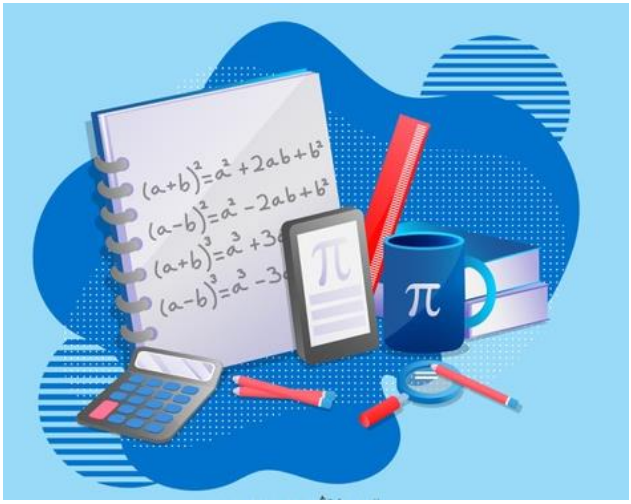
Eg. $4\times 3a-(12+5a)$ when a = 2

$= 4\times(3\times 2)-(12+5\times 2)$

$= 4\times 6-(12+10)$

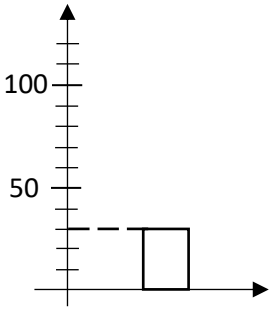
$= 24-22$

$= 2$



Statistics

79. When reading axis on graphs, count the number of gaps to decide how much is one small gap.



5 gaps = 50

1 gap = 10

3 gaps = 30

80. Total = Average × Number of Items

Eg. Average of 3 numbers is 20. If the first two are 15 and 25, find the third number.

Total of 3 numbers = 20 × 3 = 60

60 – 15 – 25 = 20

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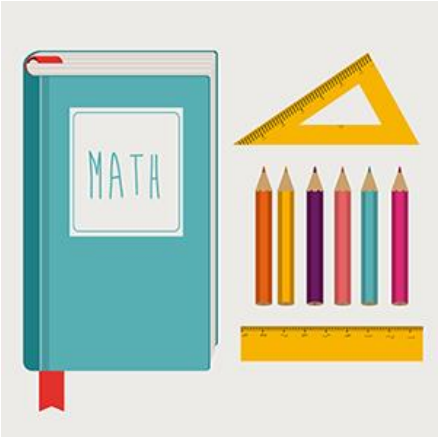

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