

The Answer Series Market Session (2022): Problem Solving for Grades 7 – 9

1. Order of operations matters, but how can you have fun challenging learners to use this knowledge?
Insert +; −; ×; ÷ and any brackets necessary to make the following true.
- 1.1 $7 \quad 6 \quad 2 = 3$
- 1.2 $7 \quad 6 \quad 2 = 84$
- 1.3 $7 \quad 6 \quad 2 = 21$
2. Practical, fun applications of HCF and LCM.
- 2.1 One bell rings every 30 minutes, and another every 35 minutes. If they both ring at 08h00, when will they next ring together?
- 2.2 Use the information given below to determine the number I am thinking of.
- The number is between 0 and 100
 - It is a multiple of 7 but not of 14
 - The tens digit is smaller than the units digit
 - The sum of the tens digit and the units digit is a prime number
- 2.3 A long corridor has 100 doors.
All the doors are locked.
When you turn the handle of any door it becomes open.
If you turn a handle again, that room becomes locked, and so on.
Every time you turn a particular handle, the door changes from being locked to unlocked, and visa versa.
A person turns all 100 handles.
Another person goes down the corridor and turns all doors that are even.
The next person then turns all doors that are multiples of 3.
This continues until the 100th person turns any door that is a multiple of 100.
Which doors are now open? And why?
3. Practical and fun applications of the relationship between numbers expressed in exponential form.
Given: $3^a + 3^2 = 90$
 $2^b + 13 = 21$
 $4^3 + 6^c = 100$
Determine the product of a , b and c .



4. Fractions can be fun when used in interesting questions.

4.1 Evaluate: $\left(1 + \frac{1}{1}\right)\left(1 + \frac{1}{2}\right)\left(1 + \frac{1}{3}\right)\left(1 + \frac{1}{4}\right)\left(1 + \frac{1}{5}\right)\left(1 + \frac{1}{6}\right)$

4.2 A box of smarties is shared between four friends.

- Ziyaad received $\frac{1}{3}$ of the box.
- Jason received $\frac{1}{5}$ of the box.
- Thandi received $\frac{1}{6}$ of the box.
- The remaining 36 smarties were given to Aron.

How many smarties were in the box originally?

4.3 Determine the values of a , b and c if

- $a + \frac{1}{b + \frac{1}{c}} = \frac{29}{9}$

and

- a , b and c are whole numbers.



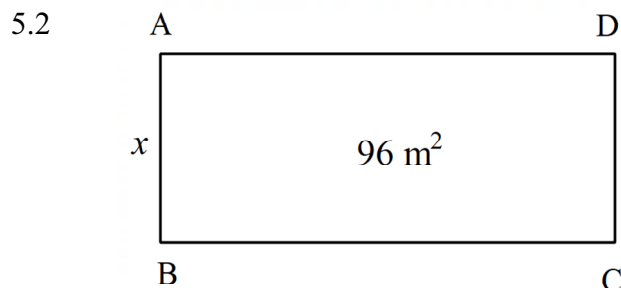
5. Solving challenging equations can be rewarding if you have a good strategy.

5.1 Monwa is 5 times as old as Siphon and half as old as Edward.

The product of their ages is 400.

Siphon is x years old.

- 5.1.1 Give Monwa and Edward's ages using x .
- 5.1.2 Set up an equation using the given information.
- 5.1.3 Solve the equation to determine Siphon's age.
- 5.1.4 Calculate the sum of their ages.



A rectangle has an area of 96 m^2 . The length is 4 more than the breadth.

- 5.2.1 $AB = x$ metres. What is the length of BC in terms of x ?
- 5.2.2 Set up an equation in terms of x , using the information you have been given.
- 5.2.3 Using trial and error, work out the length and the breadth of the rectangle.
- 5.2.4 Check that your answer is correct.

The Answer Series Market Session (2022): Problem Solving for Grades 7 – 9 Solutions

1.1 $7 - 6 + 2 = 3$ 1.2 $7 \times 6 \times 2 = 84$ 1.3 $7 \times 6 \div 2 = 21$

2.1 The LCM of 30 and 35 :

$5 \times 6 \times 7 = 210$ minutes

$= 3$ hours 30 minutes

The bells will next ring together at 11h30.

2.2 7; 21; 35; 49; 63; 77; 91

- $3 + 5 = 8$ is not prime
- $4 + 9 = 13$ is prime

You are thinking of the number 49.

2.3 QR Code alongside.



Door \ Person	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21
1	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O	O
2		L		L		L		L		L		L		L		L		L		L	
3			L			O			L			O			L			O			L
4				O				O				L				O				O	
5					L					O					O						L
6						L						O						L			
7							L							O							O
8								L								L					
9									O									O			
10										L										O	
11											L										
12												L									
13													L								
14														L							
15															L						
16																O					
17																	L				
18																		L			
19																			L		
20																				L	
21																					L

Numbers with an even number of factors will be locked and unlocked an even number of times, so they will end up being lock. Square numbers have an odd number of factors, so they will end up open.

1; 4; 9; 16; 25; 36; 49; 64; 81; 100 will end up open.

3.

$$3^a + 3^2 = 81 + 9$$

$$3^a = 3^4$$

$$\therefore a = 4$$

$$abc = (4)(3)(2) = 24$$

$$2^b + 13 = 8 + 13$$

$$2^b = 2^3$$

$$\therefore b = 3$$

$$4^3 + 6^c = 64 + 36$$

$$6^c = 6^2$$

$$\therefore c = 2$$

4.1

$$\begin{aligned} & \left(1 + \frac{1}{1}\right) \left(1 + \frac{1}{2}\right) \left(1 + \frac{1}{3}\right) \left(1 + \frac{1}{4}\right) \left(1 + \frac{1}{5}\right) \left(1 + \frac{1}{6}\right) \\ &= \left(\frac{2}{1}\right) \left(\frac{3}{2}\right) \left(\frac{4}{3}\right) \left(\frac{5}{4}\right) \left(\frac{6}{5}\right) \left(\frac{7}{6}\right) \\ &= 7 \end{aligned}$$

4.2 Ziyaad, Jason and Thandi together received $\frac{10+6+5}{30} = \frac{21}{30} = \frac{7}{10}$ of the box.

Aron's share of 36 smarties is $\frac{3}{10}$ of the box.

$\frac{1}{10}$ of the box is 12 smarties, so there were originally 120 smarties in the box.

4.3

$$\begin{aligned} \boxed{a} + \frac{1}{b + \frac{1}{c}} &= \frac{29}{9} = 3\frac{2}{9} \\ \therefore \boxed{a} + \frac{1}{b + \frac{1}{c}} &= \boxed{3} + \frac{2}{9} \\ a &= 3 \end{aligned}$$

$$\begin{aligned} \frac{1}{b + \frac{1}{c}} &= \frac{2}{9} \\ b + \frac{1}{c} &= \frac{9}{2} = 4 + \frac{1}{2} \\ \therefore b &= 4 \text{ and } c = 2 \end{aligned}$$



5.1.1 Monwa is $5x$ years old and Edward is $10x$ years old.

$$5.1.2 \quad x(5x)(10x) = 50x^3$$

$$5.1.3 \quad 50x^3 = 400$$

$$\therefore x^3 = 8$$

$$\therefore x = 2$$

5.1.4 Sipho is 2 years old, Monwa is 10 years old and Edward is 20 years old.

The sum of their ages is 32 years.

$$5.2.1 \quad BC = (x + 4) \text{ metres}$$

$$5.2.2 \quad x(x + 4) = 96$$

5.2.3 We need factors of 96 that differ by 4.

$$12 \times 8 = 96 \quad (\text{If you know your tables, you don't need to guess!})$$

The length is 12 m and the breadth is 8 m.

$$5.2.4 \quad \text{Area of rectangle} = 12\text{m} \times 8\text{m} = 96\text{m}^2$$