



Problem Solving



1. Animals on the Farm

Farmer Brown has 20 animals (sheep and chickens). They have a total of 62 legs.

How many chickens are there? _____

2. Fence Posts

On Farmer Brown's farm there is a fence around a square paddock. There are 10 posts along each side of the square. How many posts are there altogether? (The answer is not 40) _____

3. How old?

If Farmer Brown is 38 years old and his niece, Lucy, is 8 years old, in how many years will Farmer Brown be three times as old as Lucy? _____

4. Waterlilies on the Pond

Farmer Brown has a pond with waterlilies. The area covered by the waterlilies doubles every 24 hours. If the pond is completely covered on day 40, on what day is it half-covered? (The answer is not 20) _____

5. Helping on the Farm

In the holidays, Lucy goes to stay with Farmer Brown for a few weeks. While she is there, she helps feed the animals. If she spends 30 minutes a day helping on each of the week days and 60 minutes a day on the weekends, how much time does Lucy spend helping Farmer Brown in the two weeks she is there? _____

6. How many pigs?

Farmer Brown sold $\frac{1}{3}$ of his pigs at market. If he had 36 pigs to start with, how many did he have left? _____

7. How many bicycles?

Lucy counted 5 cycle riders and 12 cycle wheels going past her house. How many bicycles and how many tricycles were there? _____

8. Chicken Pen

Farmer Brown has 36 metres of fencing wire. He wants to use it to make a pen with the largest possible area. What should the dimensions of the pen be? (Use whole numbers). _____

9. A problem of age

If Lucy's father is now 5 times as old as Lucy, how many years ago was Lucy 2 years old and her father 34 years old? _____

10. Change in the river level

The river near Farmer Brown's farm flooded. The level at which it floods is marked at zero. Due to heavy rains, the water level changed from -4 metres to 3 metres on the marker. By how many metres had the river level changed? _____

11. Mass

True or False (Explain your answer)

Lucy weighs 25 kg standing on one foot, so she must weigh 50 kg standing on two feet. _____

12. Eggs for sale:

If a hen lays an average of 6 eggs a week, approximately how many eggs would she lay in a year? _____

13. Earning power:

If the eggs cost approximately £1.50 per dozen, how much would the hen's eggs earn in one year? _____

14. One Year Old

If hens start to lay eggs when they are about 20 weeks old, how many eggs would a hen lay by the time she was 1 year old?



Problem Solving

Answer sheets



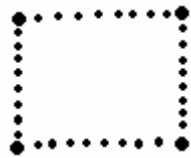
1. Animals on the Farm

Farmer Brown has 20 animals (sheep and chickens). They have a total of 62 legs. How many chickens are there?

What do I know?	What I need to find out?	This is how I did it
There are 21 sheep and chickens altogether They have a total of 62 legs	How many chickens are there?	'Guess and check' problem solving strategy. I could try 10 sheep and 10 chickens $10 \times 4 = 40$ and $10 \times 2 = 20$. That's not enough, but it's close. I would have to change my guess slightly...I'm short of the total by 2, so I need to add a chicken. Therefore $10 \times 4 = 40$ plus $11 \times 2 = 22$ and the total is 62. The answer is 11 chickens.

2. Fence Posts

On Farmer Brown's farm there is a fence around a square paddock. There are 10 posts along each side of the square. How many posts are there altogether?
(The answer is not 40)

What do I know?	What I need to find out?	This is how I did it
There is a square paddock on the farm There are 10 posts along each side The answer is not 40	How many posts are there?	'Draw a picture or a diagram' problem solving strategy. Draw a square and mark 10 posts along each side (note the corners). Then count how many you have drawn.  There are 4 corner posts and 8 posts along each side between them. Therefore there are 4×8 posts (32) plus the 4 corner posts. The answer is 36 posts.

3. How old?

If Farmer Brown is 38 years old and his niece, Lucy, is 8 years old, in how many years will Farmer Brown be three times as old as Lucy?

What do I know?	What I need to find out?	This is how I did it																
Farmer Brown is 38 years old Lucy is 8 years old	In how many years will Farmer Brown be three times as old as Lucy?	‘Draw a table’ problem solving strategy. <table><tr><td>38</td><td>39</td><td>40</td><td>41</td><td>42</td><td>43</td><td>44</td><td>45</td></tr><tr><td>8</td><td>9</td><td>10</td><td>11</td><td>12</td><td>13</td><td>14</td><td>15</td></tr></table> $3 \times 15 = 45$ The answer is ‘in 7 years’	38	39	40	41	42	43	44	45	8	9	10	11	12	13	14	15
38	39	40	41	42	43	44	45											
8	9	10	11	12	13	14	15											

4. Waterlilies on the Pond

Farmer Brown has a pond with waterlilies. The area covered by the waterlilies doubles every 24 hours. If the pond is completely covered on day 40, on what day is it half-covered? (The answer is not 20)

What do I know?	What I need to find out	This is how I did it
Waterlilies double in area every 24 hours The pond is totally covered on day 40 The answer is not 20	On what day is the pond half-covered?	'Word backwards' problem solving strategy. Day 40 the pond is completely covered, so Day 39 it is half-covered. It doubles every day Day 39  Day 40  The answer is Day 39.

5. Helping on the Farm

In the holidays, Lucy goes to stay with Farmer Brown for a few weeks. While she is there, she helps feed the animals. If she spends 30 minutes a day helping on each of the week days and 60 minutes a day on the weekends, how much time does Lucy spend helping Farmer Brown in the two weeks she is there?

What do I know?	What I need to find out?	This is how I did it
Lucy helps 30 minutes on Mon, Tue, Wed, Thu and Fri Lucy helps 45 minutes on Sat and Sun She stays for 2 weeks	How much time does Lucy spend helping for the 2 weeks?	'Write an equation' problem solving strategy. $30 \times 5 = \text{minutes during the week} = 150 \text{ mins}$ $45 \times 2 = \text{minutes during the weekend} = 90 \text{ mins}$ Multiply by 2 as there are two weeks. = 480 $\{(30 \times 5) + (45 \times 2)\} \times 2 = 480 \text{ mins}$ The answer is 480 minutes or 8 hours.

6. How many pigs?

Farmer Brown sold $\frac{1}{3}$ of his pigs at market. If he had 36 pigs to start with, how many did he have left?

What do I know?	What I need to find out?	This is how I did it
Farmer Brown had 36 pigs He sold $\frac{1}{3}$ of them.	How many pigs did Farmer Brown have left?	'Write an equation' problem solving strategy. $\frac{1}{3}$ of 36 equals 12 $36 - (\frac{1}{3} \times 36) = 24$. The answer is 24 pigs.

7. How many bicycles?

Lucy counted 5 cycle riders and 12 cycle wheels going past her house. How many bicycles and how many tricycles were there?

What do I know?	What I need to find out?	This is how I did it
There were 5 riders There were 12 wheels	How many bicycles and how many cycles were there?	"Guess and check" problem solving strategy. Try 2 bicycles ($2 \times 2 = 4$) and 3 tricycles ($3 \times 3 = 9$) = 13. That's too many wheels, so take one of the tricycles and add a bicycle. 3 bikes ($3 \times 2 = 6$) and 2 trikes ($2 \times 3 = 6$) Total 12 The answer is 3 bicycles and 2 tricycles.

8. Chicken Pen

Farmer Brown has 36 metres of fencing wire. He wants to use it to make a pen with the largest possible area. What should the dimensions of the pen be? (Use whole numbers).

What do I know?	What I need to find out?	This is how I did it
He has 36 metres of wire He wants to make a pen with the largest possible area	What should the dimensions of the pen be?	The perimeter is going to be 36 metres, so the length plus the breadth (half way around) is 18 metres. Look at the combinations to make 18. $17 + 1 = 18$ and the area would be $17 \times 1 = 17$ metres $9 + 9 = 18$ and the area would be $9 \times 9 = 81$ metres, which appears to be the largest. (To be sure, try one more, $8 + 10 = 18$ and the area is 80, which is less than the 9×9 square pen.) 17 metres ($17 \times 1 = 17$) 81 metres ($9 \times 9 = 81$) The answer is 9 metres by 9 metres.

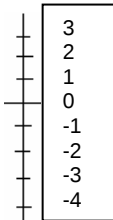
9. A problem of age

If Lucy's father is now 5 times as old as Lucy, how many years ago was Lucy 2 years old and her father 34 years old?

What do I know?	What I need to find out?	This is how I did it										
Lucy's father is 5 times as old as Lucy	How many years ago was Lucy 2 years old and her father 34 years?	'Make a table' problem solving strategy. Lucy's father would be more than 20 years old, so that's a good starting point. <table><tr><td>4</td><td>5</td><td>6</td><td>7</td><td>8</td></tr><tr><td>20</td><td>25</td><td>30</td><td>35</td><td>40</td></tr></table> So when Lucy's father was 40, she was 8. 6 years before that, Lucy's father was 34 years and she was 2 years old. The answer is 6 years ago.	4	5	6	7	8	20	25	30	35	40
4	5	6	7	8								
20	25	30	35	40								

10. Change in the river level

The river near Farmer Brown's farm flooded. The level at which it floods is marked at zero. Due to heavy rains, the water level changed from -4 metres to 3 metres on the marker. By how many metres had the river level changed?

What do I know?	What do I need to find out?	This is how I did it
The flood level of the river is zero Before the rain it was -4 metres After the rain it was +3 metres	By how many metres had the river level changed?	'Draw a diagram' problem solving strategy.  So if you start at -4m and count up to 3m, you can see a total of 7 m rise. The answer is 7 metres.

11. Mass

True or False (Explain your answer)

Lucy weighs 25 kg standing on one foot, so she must weigh 50 kg standing on two feet.

The explanation is that your weight doesn't change. If you weigh 25 kg, then that is your total weight, regardless of how you distribute it – standing on one foot or two.

12. Eggs for sale:

If a hen lays an average of 6 eggs a week, approximately how many eggs would she lay in a year?

What do I know?	What I need to find out?	This is how I did it
A hen lays 6 eggs a week There are 52 weeks in a year	How many eggs does she lay in a year?	'Write an equation' problem solving strategy. If a hen lays 6 eggs in a week and there are 52 weeks in a year, then the hen will lay approximately 300 eggs in a year. $6 \times 50 = 300$ The answer is approximately 300

13. Earning power:

If the eggs cost approximately £1.50 per dozen, how much would the hen's eggs earn in one year?

What do I know?	What I need to find out?	This is how I did it
A hen lays approximately 300 eggs in a year Eggs sell for approximately £1.50 per dozen	How much would the hen's eggs earn in a year?	'Write an equation' problem solving strategy. If a hen lays 300 eggs in a year and the eggs sell for £1.50 per dozen, then the total earnings would be: 300 divided by 12 to see how many dozen (i.e. 25 dozen) and multiply by the cost per dozen. $25 \text{ dozen} \times £1.50 = £37.50$ The answer is £37.50

14. One Year Old

If hens start to lay eggs when they are about 20 weeks old, how many eggs would a hen lay by the time she was 1 year old?

What do I know?	What I need to find out?	This is how I did it
A hen lays an average of 6 eggs in a week She lays from 20 weeks	How many eggs would the hen lay by the time she was one year old?	'Write an equation' problem solving strategy. If a hen lays an average of 6 eggs in a week and she starts laying from 20 weeks of age, how many will she lay by the time she is one year old? There are 52 weeks in a year, so she will have 32 laying weeks at six eggs a week. $32 \times 6 = 192 \text{ eggs}$ The answer is 192 eggs (approximately, as 6 eggs a week in only an approximate figure).