Algebra in 11 Plus Maths

Q1. In February, three salesmen working in an Electronic store sold a total 140 laptops. Ben sold half as many laptops as Sean, who sold half as many as Michael.

Work out how many computers each of the three salesmen sold in February?

Q2. Last week, 11 552 people in Manchester watched football match, live on TV. The number of men and children who watched the match was 8763 and the number of men and women who watched was 5874.

Work out the number of: a) women who watched, b) children who watched and c) men who watched the match live.

Q3. In her piggy bank, Samantha saved a total of £5.25. She has two times as many 5p coins as 2p coins and twice as many 2p coins as 1p coins.

Can you work out how many: 5p coins; 2p coins; 1p coins Samantha has?

Q4. The total ages of Grandma, Mum and myself add up to 105 years. Grandma is two times as old as Mum and Mum is twice as old as I am.

Can you work out how old all 3 of us are?

Q5. Three boys between them scored 39 goals last month. Bradley scored 3 times as many goals as Jacob, and Jacob scored 3 times as many goals as Sean.

Work out how many goals each of the three boys scored.

Q6. The congregation of South Ockendon local Methodist church totals 364 people. There are 18 more women than men in the church.

Work out the number of: a) men b) women attending the church.
Algebra in 11 Plus Maths

Q7. Between them 3 friends, Shane, Charlie and Jeremy won 126 points in a contest. Charlie won 3 points from Shane and Jeremy lost 2 points to Charlie.

Later in the contest, they found out that Shane had twice as many points as Charlie and Charlie had twice as many as Jeremy.

a) Work out how many points each of the 3 friends had at the end of the contest.
b) Work out how many points each of the 3 friends had at the start of the contest.

Q8. A jumbo jet airline holds a total of 476 airline staff and passengers aboard. The female passengers and the airline staff together total 241. The male passengers and the airline staff together total 258.

Work out how many: a) airline staff are on board; b) men are on board; c) women are on board.

Q9. Mr Thompson has 17 222 farm animals. He has a total of 9142 cattle and sheep, and a total of 13, 201 sheep and pigs.

Calculate how many: a) sheep; b) cattle; c) pigs, Mr Thompson owns.

Q10. Last Christmas, 3 salesmen working in an Electronic store sold a total of 140 FIFA games. Simon sold \( \frac{1}{3} \) as many games as Aaron, and Aaron sold \( \frac{1}{2} \) as many games as Norbert.

Work out how many FIFA games each of the three salesmen sold.

Q11. In our local primary school, there are a total of 394 teachers and pupils. The teachers and the boys together total 189, and the girls and the teachers together total 217.

Work out how many: a) teachers; b) boys; c) girls, are in the school.
**Algebra in 11 Plus Maths - Solutions**

Q1. *In February, three salesmen working in an Electronic store sold a total 140 laptops. Ben sold half as many laptops as Sean, who sold half as many as Michael. Work out how many computers each of the three salesmen sold in February?*

Ans 1. [Let's say Ben sold 'w' games. This means Sean sold 2w, (question says Ben sold ½ as many as Sean). If Sean sold '2w' games, then Michael sold '4w', twice as many as Sean]

<table>
<thead>
<tr>
<th></th>
<th>Ben</th>
<th>Sean</th>
<th>Michael</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>w</td>
<td>2w</td>
<td>4w</td>
</tr>
</tbody>
</table>

[Question says total number of laptops sold = 140]

This means: [w + 2w + 4w = 140]

\[
7w = 140 \quad \text{laptops} \\
\text{[w = 140 ÷ 7 = 20]}
\]

[w = 20 laptops] If [w = 20] then:

<table>
<thead>
<tr>
<th></th>
<th>Ben</th>
<th>Sean</th>
<th>Michael</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>w</td>
<td>2w</td>
<td>4w</td>
</tr>
</tbody>
</table>

[1 x 20 = 20] [2 x 20 = 40] [4 x 20 = 80]

[Ben sold 20 laptops] [Sean sold 40 laptops] [Michael sold 80 laptops]

Check: [If you add up all the laptops sold, they should total 140]
Algebra in 11 Plus Maths - Solutions

Q2. Last week, 11,552 people in Manchester watched a football match, live on TV. The number of men and children who watched the match was 8,763 and the number of men and women who watched was 5,874.

Work out the number of: a) women who watched, b) men who watched and c) children who watched the match live.

Ans 2. Total number of people watching the match = 11,552
(represent the women by 'x', the men by 'y' and children by 'z')

<table>
<thead>
<tr>
<th>women</th>
<th>men</th>
<th>children</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>y</td>
<td>z</td>
</tr>
</tbody>
</table>

(1) \( x + y + z = 11,552 \) [Total no. of people watching]

Question says:

(2) \( y + z = 8,763 \) [men + children = 8,763]
(3) \( x + y = 5,874 \) [women + men = 5,874]

Ans 2a. Substitute \( y + z = 8,763 \) in equation (3) into equation (1)

\[
(1) \quad x + (y + z) = 11,552 \\
\quad x + 8,763 = 11,552 \\
\quad x = 11,552 - 8,763 \quad \text{[using inverse]} \\
\quad [x = 2,789] = [2,789 \text{ women watched the match}]
\]

Ans 2b. Substitute 2,789 for 'x' in equation (3)

\[
(3) \quad x + y = 5,874 \\
\quad 2,789 + y = 5,874 \\
\quad y = 5,874 - 2,789 \\
\quad [y = 3,085] = [3,085 \text{ men watched the match}]
\]

Ans 2c. Substitute \( y = 3,085 \) into equation (2)

\[
(2) \quad y + z = 8,763 \quad \text{[men + children = 8,763]} \\
\quad 3,085 + z = 8,763 \\
\quad z = 8,763 - 3,085 \quad \text{[using inverse]} \\
\quad [z = 5,678] = [5,678 \text{ children watched the match}]
\]
In her piggy bank, Samantha saved a total of £5.25. She has two times as many 5p coins as 2p coins and twice as many 2p coins as 1p coins.

Can you work out how many: 5p coins; 2p coins; 1p coins Samantha has?

Ans 3.

<table>
<thead>
<tr>
<th>Coins</th>
<th>Ratio</th>
</tr>
</thead>
<tbody>
<tr>
<td>5p Coins</td>
<td>4</td>
</tr>
<tr>
<td>2p Coins</td>
<td>2</td>
</tr>
<tr>
<td>1p Coins</td>
<td>1</td>
</tr>
</tbody>
</table>

[times each coin by its ratio to find the amount of each coin]

<table>
<thead>
<tr>
<th>Coins</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>5p</td>
<td>(5p x 4)</td>
</tr>
<tr>
<td>2p</td>
<td>(2p x 2)</td>
</tr>
<tr>
<td>1p</td>
<td>(1p x 1)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>Pounds</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>20p</td>
<td>(4 x 21 = 84)</td>
</tr>
<tr>
<td>4p</td>
<td>(2 x 21 = 42)</td>
</tr>
<tr>
<td>1p</td>
<td>(1 x 21 = 21)</td>
</tr>
</tbody>
</table>

[add up the amounts worked out for each coin and divide into 525p]

\[
525 \div 25 = 21 \quad \text{[£5.25 = 525p]}
\]

[times each of the coin ratios by '21' to get number of each coin]

<table>
<thead>
<tr>
<th>Coins</th>
<th>Amount</th>
</tr>
</thead>
<tbody>
<tr>
<td>5p Coins</td>
<td>84</td>
</tr>
<tr>
<td>2p Coins</td>
<td>42</td>
</tr>
<tr>
<td>1p Coins</td>
<td>21</td>
</tr>
</tbody>
</table>

[No. of 5p = 84] [No. of 2p = 42] [No. of 1p = 21]
Algebra in 11 Plus Maths - Solutions

Q4. The total ages of Grandma, Mum and myself add up to 105 years. Grandma is two times as old as Mum and Mum is twice as old as I am. Can you work out how old all 3 of us are?

Ans 4. Grandma  Mum  Me
4w   2w   w

[Call my age 'w'. This means Mum's age is '2w' (2 times as old as I am) and Grandma's age is '4w' (2 times as old as Mum)]

\[
4w + 2w + w = 105 \text{ years} \quad \text{[using algebra]}
\]
\[
7w = 105 \text{ years}
\]
\[
w = \frac{105}{7} = 15
\]

If \[w = 15\], then Grandma is 60 years, Mum is 30 years, and I am 15 years.

Check: [If you add up all our ages, they should total 105]
Q5. *Three boys between them scored 39 goals last month. Bradley scored 3 times as many goals as Jacob, and Jacob scored 3 times as many goals as Sean.*

*Work out how many goals each of the three boys scored.*

Ans 5. | Bradley | Jacob | Sean |
<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>9w</td>
<td>3w</td>
<td>w</td>
</tr>
</tbody>
</table>

*Call Sean's goals 'w'. This means Jacob scored '3w' goals (3 times as many as Sean and Bradley scored '9w' (3 times as many as Jacob)]

\[9w + 3w + w = 39 \text{ goals} \quad \text{[using algebra]}\]
\[13w = 39 \text{ goals}\]
\[w = \frac{39}{13}\]
\[[w = 3 \text{ goals}] \quad \text{If } w = 3, \text{ then}\]

<table>
<thead>
<tr>
<th>Bradley</th>
<th>Jacob</th>
<th>Sean</th>
</tr>
</thead>
<tbody>
<tr>
<td>9w</td>
<td>3w</td>
<td>w</td>
</tr>
</tbody>
</table>

\[9 \times 3 = 27\quad [3 \times 3 = 9]\quad [3 \times 1 = 3]\]

*[Bradley scored 27 goals] [Jacob scored 9 goals] [Sean scored 3 goals]*

*Check: [If you add up all the goals the boys scored, they should total 39]*

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Algebra in 11 Plus Maths - Solutions

Q6. The congregation of South Ockendon local Methodist church totals 364 people. There are 18 more women than men in the church.

Work out the number of: a) men   b) women, attending the church.

Ans 6. Congregation of church = 364 [18 more women than men]

[call number of men 'w']

[If No. of men = w, then No. of women will be (w + 18)]

No. of men. + No. of women = 364
w + (w + 18) = 364 [using algebra]

2w = 364 - 18
2w = 346

w = 346 ÷ 2
[w = 173]

No. of men. + No. of women = 364
w + (w + 18) = 364

173 + 173 + 18 = 364

[173 men + 191 women = 364]
Between them 3 friends, Shane, Charlie and Jeremy won 126 points in a contest. Charlie won 3 points from Shane and Jeremy lost 2 points to Charlie.

Later in the contest, they found out that Shane had twice as many points as Charlie and Charlie had twice as many as Jeremy.

a) Work out how many points each of the 3 friends had at the end of the contest.
b) Work out how many points each of the 3 friends had at the start of the contest.

**Ans 7.**

<table>
<thead>
<tr>
<th>Shane</th>
<th>Charlie</th>
<th>Jeremy</th>
</tr>
</thead>
<tbody>
<tr>
<td>4w</td>
<td>2w</td>
<td>w</td>
</tr>
</tbody>
</table>

\[ 4w + 2w + w = 126 \text{ points} \]

\[ 7w = 126 \]

\[ w = \frac{126}{7} \]

\[ w = 18 \]

**Shane**  \[4w = 4 \times 18 = 72\]
**Charlie**  \[2w = 2 \times 18 = 36\]
**Jeremy**  \[w = 18\]

**Ans 7a.**

At the end of the contest:

\[ \text{Shane} = 72 \text{ points}; \quad \text{Charlie} = 36 \text{ points}; \quad \text{Jeremy} = 18 \text{ points} \]

To work out number of points each had at the start of the contest, remember the question says:

*Charlie won 3 from Shane and gained 2 from Jeremy. This means; Charlie gained 5 from Shane & Jeremy, so he must have had \[36 - 5 = 31\]*

*Jeremy lost 2 to Charlie, so Jeremy must have had \[18 + 2 = 20\]*

*Shane lost 3 to Charlie so Shane must have had \[72 + 3 = 75\]*

**Ans 7b.**

At the start of the same:

\[ \text{Shane} = 75 \text{ points}; \quad \text{Charlie} = 31 \text{ points}; \quad \text{Jeremy} = 20 \text{ points} \]
A jumbo jet airline holds a total of 476 airline staff and passengers aboard. The female passengers and the airline staff together total 241. The male passengers and the airline staff together total 258.

Work out how many: a) women are on board; b) men are on board; c) airline staff are on board.

Total number of passengers and airline staff = 476
(represent the female passengers by 'x', the male passengers by 'y' and the airline staff by 'z')

<table>
<thead>
<tr>
<th>female</th>
<th>males</th>
<th>staff</th>
</tr>
</thead>
<tbody>
<tr>
<td>x</td>
<td>y</td>
<td>z</td>
</tr>
</tbody>
</table>

(1) \[ x + y + z = 476 \] [total of passengers and staff]

Question says:

(2) \[ x + z = 241 \] [females + staff = 241]
(3) \[ y + z = 258 \] [males + staff = 258]

Ans 8a. Substitute \( y + z = 258 \) in equation (3) into equation (1)

\[ x + (y + z) = 476 \]
\[ x + 258 = 476 \]
\[ x = 476 - 258 \] [using inverse]
\[ x = 218 \] = [218 females]

Ans 8b. Substitute \( x + z = 241 \) in equation (2) into equation (1)

(1) \[ x + (y + z) = 476 \]
(1) \[ (x + z) + y = 476 \]
(241) \[ + y = 476 \]
\[ y = 476 - 241 \] [using inverse]
\[ y = 235 \] = [235 males]

Ans 8c. Substitute 218 for 'x' in equation (2)

(2) \[ x + z = 241 \]
\[ 218 + z = 241 \]
\[ z = 241 - 218 \]
\[ z = 23 \] = [23 airline staff]
Mr Thompson has 17,222 farm animals. He has a total of 9,142 cattle and sheep, and a total of 13,201 sheep and pigs.

Calculate how many: a) cattle; b) sheep; c) pigs, Mr Thompson owns.

Ans 9.

Total number of farm animals = 17,222
(represent the cattle by 'x', the pigs by 'y' and the sheep by 'z')

\[
\begin{array}{ccc}
cattle & pigs & sheep \\
x & y & z \\
\end{array}
\]

(1) \( x + y + z = 17,222 \) [Total of cattle, pigs & sheep]

Question says:

(2) \( x + z = 9,142 \) [cattle + sheep = 9,142]
(3) \( y + z = 13,201 \) [pigs + sheep = 13,201]

Ans 9a. Substitute \( y + z = \) in equation (1) by 13,201 in equation (3)

(1) \( x + (y + z) = 17,222 \)
\[ x + (13,201) = 17,222 \]
\[ x = 17,222 - 13,201 \] \[ \text{[using inverse]} \]
\[ x = 4,021 \] \[ = [4,021 \text{ cattle}] \]

Ans 9b. Substitute 4,021 for 'x' in equation (2)

(2) \( x + z = 9,142 \)
\[ 4,021 + z = 9,142 \]
\[ z = 9,142 - 4,021 \] \[ \text{[using inverse]} \]
\[ z = 5,121 \] \[ = [5,121 \text{ sheep}] \]

Ans 9c. Substitute 5,121 for 'y' in equation (3)

(3) \( y + z = 13,201 \)
\[ y + 5,121 = 13,201 \]
\[ y = 13,201 - 5,121 \] \[ \text{[using inverse]} \]
\[ y = 8,080 \] \[ = [8,080 \text{ pigs}] \]
Algebra in 11 Plus Maths - Solutions

Q10. Last Christmas, 3 salesmen working in an Electronic store sold a total of 140 FIFA games. Simon sold \(\frac{1}{3}\) as many games as Aaron, and Aaron sold \(\frac{1}{2}\) as many games as Norbert.

Work out how many FIFA games each of the three salesmen sold.

Ans 10. [Let's say Aaron sold 'w' games. This means Simon sold \(\frac{1}{3}w\), (question says Simon sold \(\frac{1}{3}\) as many as Aaron). If Aaron sold 'w' games, then Norbert sold '2w', twice as many as Aaron]

<table>
<thead>
<tr>
<th>Simon</th>
<th>Aaron</th>
<th>Norbert</th>
</tr>
</thead>
<tbody>
<tr>
<td>(\frac{1}{3}w)</td>
<td>w</td>
<td>2w</td>
</tr>
</tbody>
</table>

\[x through by '3' to get rid of the fraction \(\frac{1}{3}\)]

<table>
<thead>
<tr>
<th>Simon</th>
<th>Aaron</th>
<th>Norbert</th>
</tr>
</thead>
<tbody>
<tr>
<td>w</td>
<td>3w</td>
<td>6w</td>
</tr>
</tbody>
</table>

[Question says total number of FIFA games sold = 140] This means: \[w + 3w + 6w = 140\] [using algebra] \[10w = 140 FIFA games\] \[w = 140 \div 10 = 14\]

If \(w = 14\) then:

<table>
<thead>
<tr>
<th>Simon</th>
<th>Aaron</th>
<th>Norbert</th>
</tr>
</thead>
<tbody>
<tr>
<td>w</td>
<td>3w</td>
<td>6w</td>
</tr>
</tbody>
</table>

[1 x 14 = 14] [3 x 14 = 42] [6 x 14 = 84]

[Simon sold 14 games] [Aaron sold 42 games] [Norbert sold 84 games]

Check: If you add up all the FIFA games sold, they should total 140]
Q11. In our local primary school, there are a total of 394 teachers and pupils. The teachers and the boys together total 189, and the girls and the teachers together total 217. Work out how many: a) girls; b) teachers; c) boys, are in the school.

Ans 11. Total number of children and teachers = 394 
(represent the teachers by 'z', the boys by 'y' and the girls by 'x')

<table>
<thead>
<tr>
<th>teachers</th>
<th>boys</th>
<th>girls</th>
</tr>
</thead>
<tbody>
<tr>
<td>z</td>
<td>y</td>
<td>x</td>
</tr>
</tbody>
</table>

(1) \( z + y + x = 394 \) [Total of teachers, boys & girls]

Question says:

(2) \( z + y = 189 \) [teachers + boys = 189]
(3) \( z + x = 217 \) [teachers + girls = 217]

Ans 11a. Substitute 'z + y' = in equation (1) by 189 in equation (2)

(1) \( (z + y) + x = 394 \)
(2) \( 189 + x = 394 \)
\( x = 394 - 189 \) [using inverse]
\( x = 205 \) = \( 205 \) girls

Ans 11b. Substitute 205 for 'x' in equation (3)

(3) \( z + x = 217 \)
\( z + (205) = 217 \)
\( z = 217 - 205 \) [using inverse]
\( z = 12 \) = \( 12 \) teachers

Ans 11c. Substitute 12 for 'z' in equation (2)

(2) \( z + y = 189 \)
\( (12) + y = 189 \)
\( y = 189 - 205 \) [using inverse]
\( y = 177 \) = \( 177 \) boys

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