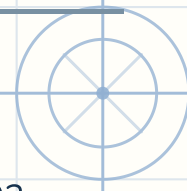


Chickens and rabbits — Up to 60 animals

Name: _____

Date: _____



Find how many four-legged animals. Show how you worked it out.

- 1 A farmyard has 58 ducks and sheep in it. Counting every leg comes to 202.

How many are sheep?

Why If all 58 had two legs there would be 116 legs. There are 202, which is 86 more. Swapping a two-legged one for a four-legged one adds 2 legs, so $86 \div 2 = 43$ sheep. More than one way works here. The other is to write both facts down and take one from the other: the two counts add to 58, and twice the first plus four times the second is 202. Doubling the first fact gives 116, and $202 - 116 = 86$ left over — two extra legs for each of the 43 sheep.

43

- 2 20 flamingos and zebras are drinking at a waterhole. There are 46 legs in the water and on the bank.

How many are zebras?

Why

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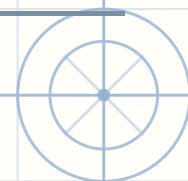
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Chickens and rabbits — Up to 60 animals

Name: _____

Date: _____



Find how many four-legged animals. Show how you worked it out.

- 3 A field holds 18 chickens and rabbits altogether. Between them they have 42 legs.

How many are rabbits?

Why

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- 4 A pet shop keeps 51 parrots and cats. Altogether they stand on 188 legs.

How many are cats?

Why

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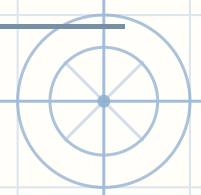
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Shopping puzzles — Totals to 120c

Name: _____

Date: _____



Find how many of each. Show the trials that failed.

- 1 A market stall charges 12c for apples and 7c for plums. A basket of both came to exactly 116c.

How many apples, and how many plums, were in the basket?

Why Every plum costs 7c, so whatever is left after the apples has to divide by 7 exactly. Try each number of apples in turn: $2 \times 12 = 24$, leaving 92, and $92 \div 7$ is not whole; $3 \times 12 = 36$, leaving 80, and $80 \div 7$ is not whole; $4 \times 12 = 48$, leaving 68, and $68 \div 7$ is not whole; $5 \times 12 = 60$, leaving 56, and $56 \div 7 = 8$. So 5 apples and 8 plums.

5 and 8

- 2 Badges cost 11c and stickers cost 8c at the school fair. Sam spent all 90c of his money on both.

How many badges, and how many stickers, did he buy?

Why

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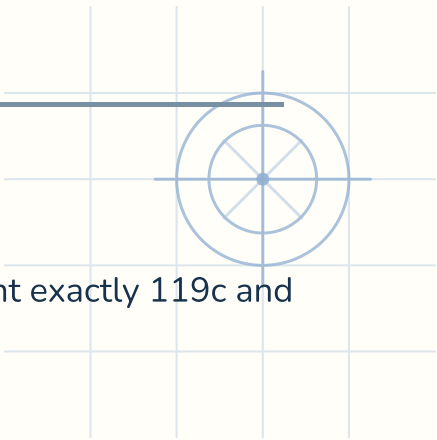
___ and ___



Shopping puzzles — Totals to 120c

Name: _____

Date: _____



Find how many of each. Show the trials that failed.

3

A shop sells pens at 10c each and erasers at 7c each. Mia spent exactly 119c and bought some of both.

How many pens, and how many erasers, did she buy?

Why

___ and ___

4

Kites are 8c each and ribbons are 7c each. A club spent exactly 91c and took some of each.

How many kites, and how many ribbons, did they take?

Why

___ and ___

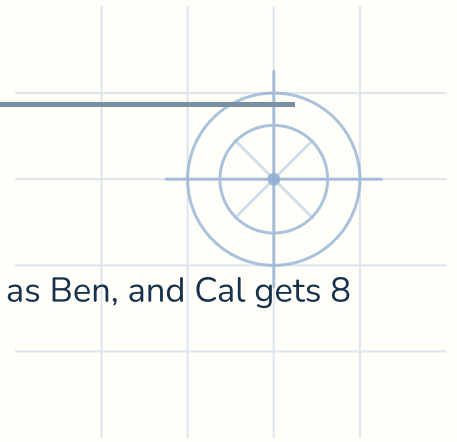


Sharing puzzles — Totals to 120

Name: _____

Date: _____

Find the smallest share. Show how you worked it out.



- 1 Ben, Ana and Cal share 88 sweets. Ana gets 2 times as many as Ben, and Cal gets 8 more than Ben.

How many does Ben get?

Why Call Ben's share one part. Then Ana has 2 parts, and Cal has one part and 8 more. That is 4 parts and 8 extra, adding to 88. Take the 8 off first: $88 - 8 = 80$. Now $80 \div 4 = 20$, so one part is 20 sweets.

20

- 2 107 books go onto three shelves. The middle shelf holds 3 times what the top shelf holds, and the bottom shelf holds 7 more than the top.

How many books are on the top shelf?

Why

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Sharing puzzles — Totals to 120

Name: _____

Date: _____



Find the smallest share. Show how you worked it out.

- 3 A prize of 64 tokens is split between Iris, Jon and Kit. Jon takes 2 times Iris's share, and Kit takes 8 more than Iris.

How many tokens does Iris get?

Why

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- 4 Three teams pick 116 apples between them. Blue picks 4 times as many as Red, and Green picks 2 more than Red.

How many does Red pick?

Why

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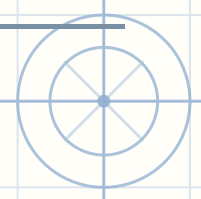
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Sum & difference — Totals to 30

Name: _____

Date: _____



Find the two numbers. Show how you worked them out.

- 1 Ava and Ben have 24 stickers between them. Ava has 12 more than Ben.

How many does each of them have?

Why Half of 24 is 12, so 12 and 12 would add up right — but they are the same, and these two differ by 12. Move half the difference, 6, from one to the other: $12 + 6 = 18$ and $12 - 6 = 6$. More than one way works here. The other is to add the two facts: $24 + 12 = 36$, and half of that is the bigger number, 18 — then $24 - 18 = 6$. Same answer, one step fewer, and it is the road algebra takes later.

Ava 18, Ben 6

- 2 Two numbers add up to 20. One of them is 10 more than the other.

What are the two numbers?

Why

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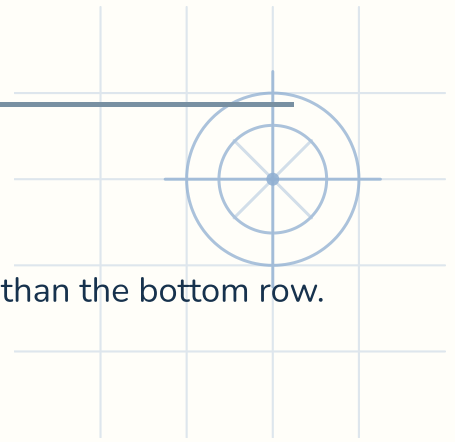
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Sum & difference — Totals to 30

Name: _____

Date: _____



Find the two numbers. Show how you worked them out.

- 3 A shelf holds 24 books on two rows. The top row has 6 more than the bottom row.

How many books are on each row?

Why

- 4 Two baskets hold 20 apples altogether. One basket has 2 more apples than the other.

How many apples are in each basket?

Why



Area & perimeter puzzles — Sides to 15

Name: _____

Date: _____

Find the two side lengths. Show how you worked them out.



- 1 A rug is a rectangle covering 72 square feet. Its braided edge runs 36 feet all the way round.

How long are its two sides?

Why Half of 36 is 18, so the two sides add to 18. They multiply to 72. Of the 6 pairs that multiply to 72, only 6 and 12 add to 18. More than one way works here. The other never lists the factors: start from the two closest numbers adding to 18, then step them apart one at a time. The product falls as they separate, so it passes 72 exactly once.

6 and 12

- 2 A field is a rectangle with an area of 180 square meters. Walking right around the edge is 54 meters.

How long are its two sides?

Why

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___ and ___



Area & perimeter puzzles — Sides to 15

Name: _____

Date: _____

Find the two side lengths. Show how you worked them out.



- 3 A rug is a rectangle covering 165 square feet. Its braided edge runs 52 feet all the way round.

How long are its two sides?

Why

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___ and ___

- 4 A poster is a rectangle. Its face is 48 square centimeters, and the ribbon around its border is 28 centimeters.

How long are its two sides?

Why

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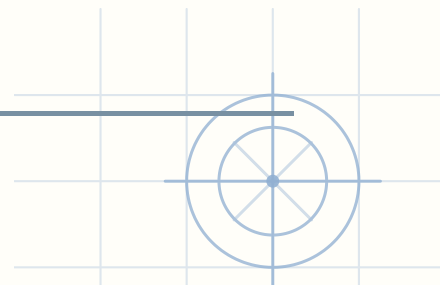
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Coin puzzles — Up to 70c

Name: _____

Date: _____



(Find the fewest coins. Show which coins they are.

- 1** On the island of Tern the only coins are 1c, 10c, 12c.

A ferry ticket costs 33c. What is the fewest coins that pay it exactly?

Why $12 + 10 + 10 + 1$ — 4 coins. Taking the biggest coin first gives $12 + 12 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1$, which is 11 coins.

4

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- 2** The town of Marrow mints just three coins: 1c, 8c, 14c.

A loaf costs 60c. What is the fewest coins that pay it exactly?

Why

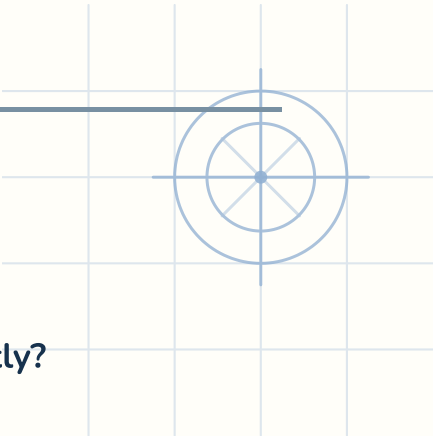
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Coin puzzles — Up to 70c

Name: _____

Date: _____



Find the fewest coins. Show which coins they are.

- 3 A machine takes only 1c, 7c, 18c tokens and gives no change.
A ride costs 47c. What is the fewest tokens that pay it exactly?

Why

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- 4 A market on Tern gives no change, and its coins come in 1c, 4c, 5c only.
A basket comes to 48c. What is the fewest coins that pay it exactly?

Why

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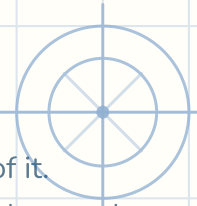
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Power Pack · Two-unknown puzzles — Answer key

If they are stuck

- What if every animal were the smaller kind? That is certainly wrong, and it is easy.
- You cannot buy part of one. What does that let you test, one number at a time?
- Whose share is the smallest? Try calling it one part and writing the others in terms of it.
- What would the two numbers be if they were the SAME? Start there, then ask what has to change.
- The perimeter counts every side twice. What is half of it?
- The way everybody pays is not the answer here. Try it anyway, then ask what it wasted.



Chickens and rabbits

1. If all 58 had two legs there would be 116 legs. There are 202, which is 86 more. Swapping a two-legged one for a four-legged one adds 2 legs, so $86 \div 2 = 43$ sheep. More than one way works here. The other is to write both facts down and take one from the other: the two counts add to 58, and twice the first plus four times the second is 202. Doubling the first fact gives 116, and $202 - 116 = 86$ left over — two extra legs for each of the 43 sheep.

3. If all 18 had two legs there would be 36 legs. There are 42, which is 6 more. Swapping a two-legged one for a four-legged one adds 2 legs, so $6 \div 2 = 3$ rabbits. More than one way works here. The other is to write both facts down and take one from the other: the two counts add to 18, and twice the first plus four times the second is 42. Doubling the first fact gives 36, and $42 - 36 = 6$ left over — two extra legs for each of the 3 rabbits.

2. If all 20 had two legs there would be 40 legs. There are 46, which is 6 more. Swapping a two-legged one for a four-legged one adds 2 legs, so $6 \div 2 = 3$ zebras. More than one way works here. The other is to write both facts down and take one from the other: the two counts add to 20, and twice the first plus four times the second is 46. Doubling the first fact gives 40, and $46 - 40 = 6$ left over — two extra legs for each of the 3 zebras.

4. If all 51 had two legs there would be 102 legs. There are 188, which is 86 more. Swapping a two-legged one for a four-legged one adds 2 legs, so $86 \div 2 = 43$ cats. More than one way works here. The other is to write both facts down and take one from the other: the two counts add to 51, and twice the first plus four times the second is 188. Doubling the first fact gives 102, and $188 - 102 = 86$ left over — two extra legs for each of the 43 cats.

Power Pack · Two-unknown puzzles — Answer key

If they are stuck

- What if every animal were the smaller kind? That is certainly wrong, and it is easy.
- You cannot buy part of one. What does that let you test, one number at a time?
- Whose share is the smallest? Try calling it one part and writing the others in terms of it.
- What would the two numbers be if they were the SAME? Start there, then ask what has to change.
- The perimeter counts every side twice. What is half of it?
- The way everybody pays is not the answer here. Try it anyway, then ask what it wasted.



One equation, two unknowns

1. Every plum costs 7c, so whatever is left after the apples has to divide by 7 exactly. Try each number of apples in turn: $2 \times 12 = 24$, leaving 92, and $92 \div 7$ is not whole; $3 \times 12 = 36$, leaving 80, and $80 \div 7$ is not whole; $4 \times 12 = 48$, leaving 68, and $68 \div 7$ is not whole; $5 \times 12 = 60$, leaving 56, and $56 \div 7 = 8$. So 5 apples and 8 plums.

3. Every eraser costs 7c, so whatever is left after the pens has to divide by 7 exactly. Try each number of pens in turn: $2 \times 10 = 20$, leaving 99, and $99 \div 7$ is not whole; $3 \times 10 = 30$, leaving 89, and $89 \div 7$ is not whole; $4 \times 10 = 40$, leaving 79, and $79 \div 7$ is not whole; $5 \times 10 = 50$, leaving 69, and $69 \div 7$ is not whole; $6 \times 10 = 60$, leaving 59, and $59 \div 7$ is not whole; $7 \times 10 = 70$, leaving 49, and $49 \div 7 = 7$. So 7 pens and 7 erasers.

Three shares from one total

1. Call Ben's share one part. Then Ana has 2 parts, and Cal has one part and 8 more. That is 4 parts and 8 extra, adding to 88. Take the 8 off first: $88 - 8 = 80$. Now $80 \div 4 = 20$, so one part is 20 sweets.

3. Call Iris's share one part. Then Jon has 2 parts, and Kit has one part and 8 more. That is 4 parts and 8 extra, adding to 64. Take the 8 off first: $64 - 8 = 56$. Now $56 \div 4 = 14$, so one part is 14 tokens.

2. Every sticker costs 8c, so whatever is left after the badges has to divide by 8 exactly. Try each number of badges in turn: $2 \times 11 = 22$, leaving 68, and $68 \div 8$ is not whole; $3 \times 11 = 33$, leaving 57, and $57 \div 8$ is not whole; $4 \times 11 = 44$, leaving 46, and $46 \div 8$ is not whole; $5 \times 11 = 55$, leaving 35, and $35 \div 8$ is not whole; $6 \times 11 = 66$, leaving 24, and $24 \div 8 = 3$. So 6 badges and 3 stickers.

4. Every ribbon costs 7c, so whatever is left after the kites has to divide by 7 exactly. Try each number of kites in turn: $2 \times 8 = 16$, leaving 75, and $75 \div 7$ is not whole; $3 \times 8 = 24$, leaving 67, and $67 \div 7$ is not whole; $4 \times 8 = 32$, leaving 59, and $59 \div 7$ is not whole; $5 \times 8 = 40$, leaving 51, and $51 \div 7$ is not whole; $6 \times 8 = 48$, leaving 43, and $43 \div 7$ is not whole; $7 \times 8 = 56$, leaving 35, and $35 \div 7 = 5$. So 7 kites and 5 ribbons.

2. Call the top shelf's share one part. Then the middle shelf has 3 parts, and the bottom shelf has one part and 7 more. That is 5 parts and 7 extra, adding to 107. Take the 7 off first: $107 - 7 = 100$. Now $100 \div 5 = 20$, so one part is 20 books.

4. Call Red's share one part. Then Blue has 4 parts, and Green has one part and 2 more. That is 6 parts and 2 extra, adding to 116. Take the 2 off first: $116 - 2 = 114$. Now $114 \div 6 = 19$, so one part is 19 apples.

Power Pack · Two-unknown puzzles — Answer key

If they are stuck

- What if every animal were the smaller kind? That is certainly wrong, and it is easy.
- You cannot buy part of one. What does that let you test, one number at a time?
- Whose share is the smallest? Try calling it one part and writing the others in terms of it.
- What would the two numbers be if they were the SAME? Start there, then ask what has to change.
- The perimeter counts every side twice. What is half of it?
- The way everybody pays is not the answer here. Try it anyway, then ask what it wasted.



Sum and difference

1. Half of 24 is 12, so 12 and 12 would add up right — but they are the same, and these two differ by 12. Move half the difference, 6, from one to the other: $12 + 6 = 18$ and $12 - 6 = 6$. More than one way works here. The other is to add the two facts: $24 + 12 = 36$, and half of that is the bigger number, 18 — then $24 - 18 = 6$. Same answer, one step fewer, and it is the road algebra takes later.

3. Half of 24 is 12, so 12 and 12 would add up right — but they are the same, and these two differ by 6. Move half the difference, 3, from one to the other: $12 + 3 = 15$ and $12 - 3 = 9$. More than one way works here. The other is to add the two facts: $24 + 6 = 30$, and half of that is the bigger number, 15 — then $24 - 15 = 9$. Same answer, one step fewer, and it is the road algebra takes later.

2. Half of 20 is 10, so 10 and 10 would add up right — but they are the same, and these two differ by 10. Move half the difference, 5, from one to the other: $10 + 5 = 15$ and $10 - 5 = 5$. More than one way works here. The other is to add the two facts: $20 + 10 = 30$, and half of that is the bigger number, 15 — then $20 - 15 = 5$. Same answer, one step fewer, and it is the road algebra takes later.

4. Half of 20 is 10, so 10 and 10 would add up right — but they are the same, and these two differ by 2. Move half the difference, 1, from one to the other: $10 + 1 = 11$ and $10 - 1 = 9$. More than one way works here. The other is to add the two facts: $20 + 2 = 22$, and half of that is the bigger number, 11 — then $20 - 11 = 9$. Same answer, one step fewer, and it is the road algebra takes later.

A rectangle from its area and perimeter

1. Half of 36 is 18, so the two sides add to 18. They multiply to 72. Of the 6 pairs that multiply to 72, only 6 and 12 add to 18. More than one way works here. The other never lists the factors: start from the two closest numbers adding to 18, then step them apart one at a time. The product falls as they separate, so it passes 72 exactly once.

3. Half of 52 is 26, so the two sides add to 26. They multiply to 165. Of the 4 pairs that multiply to 165, only 11 and 15 add to 26. More than one way works here. The other never lists the factors: start from the two closest numbers adding to 26, then step them apart one at a time. The product falls as they separate, so it passes 165 exactly once.

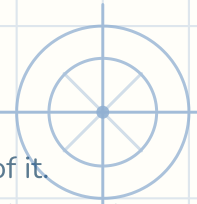
2. Half of 54 is 27, so the two sides add to 27. They multiply to 180. Of the 9 pairs that multiply to 180, only 12 and 15 add to 27. More than one way works here. The other never lists the factors: start from the two closest numbers adding to 27, then step them apart one at a time. The product falls as they separate, so it passes 180 exactly once.

4. Half of 28 is 14, so the two sides add to 14. They multiply to 48. Of the 5 pairs that multiply to 48, only 6 and 8 add to 14. More than one way works here. The other never lists the factors: start from the two closest numbers adding to 14, then step them apart one at a time. The product falls as they separate, so it passes 48 exactly once.

Power Pack · Two-unknown puzzles — Answer key

If they are stuck

- What if every animal were the smaller kind? That is certainly wrong, and it is easy.
- You cannot buy part of one. What does that let you test, one number at a time?
- Whose share is the smallest? Try calling it one part and writing the others in terms of it.
- What would the two numbers be if they were the SAME? Start there, then ask what has to change.
- The perimeter counts every side twice. What is half of it?
- The way everybody pays is not the answer here. Try it anyway, then ask what it wasted.



Fewest coins

1. $12 + 10 + 10 + 1$ — 4 coins. Taking the biggest coin first gives $12 + 12 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1 + 1$, which is 11 coins.

3. $18 + 7 + 7 + 7 + 7 + 1$ — 6 tokens. Taking the biggest token first gives $18 + 18 + 7 + 1 + 1 + 1 + 1$, which is 7 tokens.

2. $14 + 14 + 8 + 8 + 8 + 8$ — 6 coins. Taking the biggest coin first gives $14 + 14 + 14 + 14 + 1 + 1 + 1 + 1$, which is 8 coins.

4. $5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 + 4 + 4$ — 10 coins. Taking the biggest coin first gives $5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 + 5 + 1 + 1$, which is 12 coins.