

# Adding and Subtracting Strategies

AC

EA

AA

AM

AP

## Compatible numbers to 20

We are learning about compatible numbers to 20.

### Exercise 1

What to do

Some of these additions make the number 20. 20 is a tidy number. Write down the questions numbers that make the total 20

- |              |               |                |
|--------------|---------------|----------------|
| 1) $14 + 6$  | (2) $3 + 17$  | (3) $5 + 13$   |
| 4) $16 + 5$  | (5) $11 + 9$  | (6) $6 + 12$   |
| 7) $14 + 3$  | (8) $10 + 10$ | (9) $9 + 12$   |
| 10) $1 + 19$ | (11) $14 + 7$ | (12) $13 + 7$  |
| 13) $12 + 9$ | (14) $18 + 2$ | (15) $14 + 8$  |
| 16) $20 + 0$ | (17) $6 + 15$ | (18) $7 + 13$  |
| 19) $9 + 8$  | (20) $15 + 6$ | (21) $11 + 12$ |

What to do

For these next sentences, copy out the question, then write down if it is true or false

- |                   |                    |                     |
|-------------------|--------------------|---------------------|
| 22) $5 + 16 = 20$ | (23) $11 + 9 = 20$ | (24) $15 + 7 = 20$  |
| 25) $8 + 12 = 20$ | (26) $5 + 15 = 20$ | (27) $7 + 9 = 20$   |
| 28) $16 + 4 = 20$ | (29) $8 + 13 = 20$ | (30) $10 + 10 = 20$ |
| 31) $2 + 19 = 20$ | (32) $11 + 7 = 20$ | (33) $18 + 2 = 20$  |
| 34) $13 + 7 = 20$ | (35) $6 + 14 = 20$ | (36) $3 + 16 = 20$  |
- 37) Some of the sums in questions 22 to 36 do not equal 20. Julia has worked out a strategy to sort out which are true and false without working out the whole sum. What might Julia's strategy be? Be prepared to discuss your strategy with your teacher and the rest of the group.

These sentences seem to be written back to front, but work the same way. Copy out each sentence then write down if it is true or false

- |                   |                    |                    |
|-------------------|--------------------|--------------------|
| 38) $20 = 3 + 17$ | (39) $20 = 6 + 16$ | (40) $20 = 9 + 11$ |
| 41) $20 = 4 + 16$ | (42) $20 = 14 + 5$ | (43) $20 = 0 + 20$ |
| 44) $20 = 7 + 13$ | (45) $20 = 12 + 9$ | (46) $20 = 1 + 19$ |

## Exercise 2: sentences with inequalities

What to do

For these next sentences, some of the additions are more than 20, some equal 20 and some are less than 20. Copy out each sentence and use the correct sign  $<$ ,  $=$ , or  $>$  to make the sentence true

- |                   |                    |                    |
|-------------------|--------------------|--------------------|
| 1) $6 + 12$ $20$  | (2) $3 + 18$ $20$  | (3) $9 + 7$ $20$   |
| 4) $5 + 15$ $20$  | (5) $2 + 18$ $20$  | (6) $6 + 17$ $20$  |
| 7) $7 + 15$ $20$  | (8) $19 + 1$ $20$  | (9) $7 + 12$ $20$  |
| 10) $16 + 4$ $20$ | (11) $13 + 6$ $20$ | (12) $7 + 13$ $20$ |
| 13) $17 + 6$ $20$ | (14) $15 + 5$ $20$ | (15) $0 + 20$ $20$ |

These sentences seem to be written back to front, but work the same way. Copy out each sentence and use the correct sign  $<$ ,  $=$ , or  $>$  to make the sentence true

- |                    |                    |                     |
|--------------------|--------------------|---------------------|
| 16) $20$ $14 + 9$  | (17) $20$ $12 + 5$ | (18) $20$ $8 + 12$  |
| 19) $20$ $10 + 10$ | (20) $20$ $9 + 9$  | (21) $20$ $11 + 10$ |
| 22) $20$ $0 + 19$  | (23) $20$ $6 + 12$ | (24) $20$ $18 + 2$  |
| 25) $20$ $7 + 13$  | (26) $20$ $9 + 13$ | (27) $20$ $5 + 13$  |
| 28) $20$ $5 + 18$  | (29) $20$ $6 + 14$ | (30) $20$ $20 + 0$  |

- 31) Marcus knows his facts to 10, meaning he has instant recall of facts like  $7 + 3 = 10$  and  $4 + 5 = 9$ . Explain how he can use this knowledge to work out which of the questions should have an equals sign put in them. Be prepared to discuss your answer to this question with your teacher and the rest of your group

## Exercise 3: equations with boxes

What to do

Replace the box with a number that makes the sentence true. Write the sentence in your book

- |                         |                          |                               |
|-------------------------|--------------------------|-------------------------------|
| 1) $9 + \square = 20$   | (2) $15 + \square = 20$  | (3) $1 + \square = 20$        |
| 4) $18 + \square = 20$  | (5) $\square + 8 = 20$   | (6) $17 + \square = 20$       |
| 7) $\square + 1 = 20$   | (8) $6 + 14 = \square$   | (9) $\square + 7 = 20$        |
| 10) $20 + \square = 20$ | (11) $\square + 2 = 20$  | (12) $15 + 5 = \square$       |
| 13) $7 + \square = 20$  | (14) $3 + 17 = \square$  | (15) $\square + 0 = 20$       |
| 16) $14 + \square = 20$ | (17) $\square + 18 = 20$ | (18) $\square + \square = 20$ |

## Exercise 4: box equations

- 1)  $\square + \triangle = 20$  This sentence shows that two different numbers add up to 20. What pairs of number add up to 20? Make a list of all the possibilities you can think of.
- 2)  $\square + \square = 10$  means that both numbers being added must be the same. This is often written as  $2 \times \square = 10$  or  $2\square = 10$   
Write these other addition sentences as multiplications
- (a)  $\square + \square = 20$  (b)  $\square + \square = 40$  (c)  $\square + \square = 60$
- (d)  $\square + \square = 30$  (e)  $\square + \square = 50$  (f)  $\square + \square = 70$
- (g)  $\square + \square + \square = 30$  (h)  $\square + \square + \square = 60$  (i)  $\square + \square + \square + \square = 40$
- 3) Write these multiplications as addition problems
- (a)  $2\square = 10$  (b)  $2\square = 20$  (c)  $2\square = 60$
- (d)  $2\square = 30$  (e)  $2\square = 50$  (f)  $3\square = 30$
- (g)  $5\square = 50$  (h)  $3\square = 60$  (i)  $4\square = 40$

## Exercise 5: compatible numbers with subtraction

What to do

Use your facts to 20 to replace the box with a number that makes the sentence true. Write the sentence

- 1)  $20 - 1 = \square$  (2)  $20 - \square = 18$  (3)  $20 - 19 = \square$
- 4)  $20 - \square = 7$  (5)  $20 - \square = 5$  (6)  $20 - 4 = \square$
- 7)  $20 - \square = 16$  (8)  $20 - \square = 12$  (9)  $20 - 6 = \square$
- 10)  $\square - 15 = 5$  (11)  $20 - \square = 7$  (12)  $\square - 9 = 11$

What to do

For these next sentences, copy out the question then write down if it is true or false

- 13)  $20 - 1 = 18$  (14)  $20 - 5 = 15$  (15)  $20 - 12 = 9$
- 16)  $20 - 14 = 6$  (17)  $20 - 7 = 12$  (18)  $20 - 6 = 14$
- 19)  $20 - 13 = 6$  (20)  $20 - 8 = 12$  (21)  $20 - 3 = 17$
- 22)  $19 + 1 = 20$  is an addition fact. Addition facts can be rewritten as subtraction facts.  $20 - 1 = 19$  is one subtraction fact you can write,  $20 - 9 = 11$  is another. For six facts to 20 write two subtraction facts that are also true.

## Exercise 6: linking subtractions and additions

What to do

Change these subtractions into addition problems.

- |            |              |             |
|------------|--------------|-------------|
| 1) 20 - 10 | (2) 20 - 5   | (3) 20 - 8  |
| 4) 20 - 6  | (5) 20 - 19  | (6) 20 - 15 |
| 7) 20 - 13 | (8) 20 - 2   | (9) 20 - 9  |
| 10) 20 - 7 | (11) 20 - 16 | (12) 20 - 1 |
- 13) Work out the answers to questions 1 to 12
- 14) Why might someone want to change a subtraction problem into an addition problem? Be prepared to discuss your explanation with your teacher and other members of your group

## Exercise 7: word problems

What to do

Some of these problems have compatible numbers in them that make the problem easier. Write out each problem with numbers, and show which are easy to do if you know your compatible numbers to 20.

- 1) Abby does 20 press-ups before she starts training. If Abby has done 12 press-ups how many more does she need to do?
- 2) Bill's dog eats 8 dog biscuits every morning while his friend Bob's eats 15. How many do they eat altogether?
- 3) There are two small bunches of grapes on the table. One bunch has 9 grapes and the other has 11. How many grapes are there altogether?
- 4) Dee College is playing a netball game against Bee College. At half time the score is 25 to 15 to Dee College. How many points ahead is Dee College?
- 5) Fin and Paul are playing a game with 20 sided dice. If Fin rolls a 17 and Paul rolls a 13 what is the total of the two dice?
- 6) Gail has a collection of 17 soft toys in her room. Her cousin Aroha has 3 more than Gail. How many do they have altogether?
- 7) Gran is writing Christmas emails to each of her 20 grandchildren. She stops for a cup of tea after she has sent 11 emails. How many more emails does she need to send?
- 8) Shane and Ellie send texts to each other every lunch time. If Ellie received 9 texts and Shane received two more than her how many texts did they send altogether?
- 9) Sandy is selling toffee apples at the school fair. Mrs Bray, the Year 9 Dean, buys 8 toffee apples when the stall opens and then comes back after lunch and buys some more as she says she needs one for each of the 20 students who are helping with the clean up. How many did she buy after lunch?
- 10) Kirsty, Pua and Jill have arranged their coloured highlighter pens on their desks. If Kirsty has 7, Pua has 8 and there are 20 altogether how many does Jill have?
- 11) Mr Grim has 3 sick children and the doctor has suggested that the children eat more fruit. Over the day the children eat all the fruit in the bowl – 7 mandarins, 6 bananas and 9 apples. How many pieces of fruit have they eaten?
- 12) Saul and Elmo are keeping a record of the number of times their soccer teams have won games this season. If Saul's team have won 18 games and Elmo's have won 2 more than this how many games have the two teams won altogether?

## Exercise 8: more word problems

What to do

Write out each problem with numbers and identify which problems can be solved using compatible "tens"

- 1) Sam and Rangi have been collecting golf balls. Their father will give them \$10 when they have collected 50 balls. Sam has collected 30 and Rangi has 20. Will they get the \$10?
- 2) Anna and Sarah are also trying to earn money from collecting golf balls. Anna has collected 41 and Sarah has collected 7. Will they get \$10?
- 3) Last Saturday they combined all of the balls they had collected – 10, 25, 15, and 10. How much money will they earn in total?
- 4) On Sunday Rangi heads out early so that he will collect a lot more golf balls. If he has collected 35 balls by 9 am how many more does he need to collect in order to earn the \$10?
- 5) There are 40 chocolates in a box and Andrew eats 31 of them. How many are left in the box?
- 6) There are 47 black-and-white cows and 13 brown cows waiting to be milked. How many cows are there altogether?
- 7) Grannie is baking hot cross buns for the family. She made 24 in the first batch and 16 in the next batch. How many has she made altogether?
- 8) Maddy is making a bead necklace with 70 beads. If she has 25 blue beads, 30 green beads and the rest are black, how many black beads are there?
- 9) Sandra works at Save & Pac and she is stacking cans of beans. If there are 4 layers and she has placed 20 in each of the first two layers and 18 in the next layer how many will be in the top layer if there are 70 cans altogether.
- 10) 69 students in Year 9 study Art and the rest study Economics. If there are 90 students altogether how many study Economics?

## Exercise 9

- 1)  $a + b = 20$

This sentence shows that two different numbers add up to 20. What pairs of number add up to 20? Make a list of all the possibilities you can think of.

# Compatible numbers to 20

## Answers

### Exercise 1

The following make the total 20

1, 2, 5, 8, 10, 12, 14, 16, 18,

- |   |            |            |            |
|---|------------|------------|------------|
| 22) False   | (23) True  | (24) False |            |
| 25) True  | (26) True  | (27) False | (28) True  |
| 29) False   | (30) True  | (31) False | (32) False |
| 33) True  | (34) True  | (35) True  | (36) False |
| 37) Your answer to this question needs to be discussed with your teacher and other students in this group |            |            |            |
| 38) True  | (39) False | (40) True  | (41) True  |
| 42) False   | (43) True  | (44) True  | (45) False |
| 46) True  |            |            |            |

### Exercise 2

- |   |        |        |        |
|---|--------|--------|--------|
| 1) <  | (2) >  | (3) <  | (4) =  |
| 5) =  | (6) >  | (7) >  | (8) =  |
| 9) <  | (10) = | (11) < | (12) = |
| 13) >   | (14) = | (15) = | (16) < |
| 17) >   | (18) = | (19) = | (20) > |
| 21) <   | (22) > | (23) > | (24) = |
| 25) =   | (26) < | (27) > | (28) < |
| 29) =   | (30) = |        |        |
| 31) Your answer to this question needs to be discussed with your teacher and other students in this group |        |        |        |

### Exercise 3

- |                    |                     |                     |                     |
|--------------------|---------------------|---------------------|---------------------|
| 1) $\square = 11$  | (2) $\square = 5$   | (3) $\square = 19$  | (4) $\square = 2$   |
| 5) $\square = 12$  | (6) $\square = 3$   | (7) $\square = 19$  | (8) $\square = 20$  |
| 9) $\square = 13$  | (10) $\square = 0$  | (11) $\square = 18$ | (12) $\square = 20$ |
| 13) $\square = 13$ | (14) $\square = 20$ | (15) $\square = 20$ | (16) $\square = 6$  |
| 17) $\square = 2$  | (18) $\square = 10$ |                     |                     |

### Exercise 4

- |     |  |          |                                    |          |  |          |          |          |
|-----|--|----------|------------------------------------|----------|--|----------|----------|----------|
| 1)  | $0 + 20$   | $1 + 19$ | $2 + 18$                           | $3 + 17$ | $4 + 16$                                     | $5 + 15$ | $6 + 14$ | $7 + 13$ |
|     | $8 + 12$   | $9 + 11$ | $10 + 10$                          | $11 + 9$ | $12 + 8$                                     | $13 + 7$ | $14 + 6$ | $15 + 5$ |
|     | $16 + 4$   | $17 + 3$ | $18 + 2$                           | $19 + 1$ | $20 + 0$                                     |          |          |          |
| 2a) | $2\square = 20$                                      | (b)      | $2\square = 40$                    | (c)      | $2\square = 60$                              |          |          |          |
| d)  | $2\square = 30$                                      | (e)      | $2\square = 50$                    | (f)      | $2\square = 70$                              |          |          |          |
| g)  | $3\square = 30$                                      | (h)      | $3\square = 60$                    | (i)      | $4\square = 40$                              |          |          |          |
| 3a) | $\square + \square = 10$                             | (b)      | $\square + \square = 20$           | (c)      | $\square + \square = 60$                     |          |          |          |
| d)  | $\square + \square = 30$                             | (e)      | $\square + \square = 50$           | (f)      | $\square + \square + \square = 30$           |          |          |          |
| g)  | $\square + \square \square + \square + \square = 50$ | (h)      | $\square + \square + \square = 60$ | (i)      | $\square + \square + \square + \square = 40$ |          |          |          |

## Exercise 5

- |                   |                    |                    |
|-------------------|--------------------|--------------------|
| 1) $20 - 1 = 19$  | (2) $20 - 2 = 18$  | (3) $20 - 19 = 1$  |
| 4) $20 - 13 = 7$  | (5) $20 - 15 = 5$  | (6) $20 - 4 = 16$  |
| 7) $20 - 4 = 16$  | (8) $20 - 8 = 12$  | (9) $20 - 6 = 14$  |
| 10) $20 - 15 = 5$ | (11) $20 - 13 = 7$ | (12) $20 - 9 = 11$ |
| 13) False         | (14) True          | (15) False         |
| 16) True          | (17) False         | (18) True          |
| 19) False         | (20) True          | (21) True          |
- 22) Compare your answers for this question with other members of your groups.

## Exercise 6

- |                        |                         |                          |                         |
|------------------------|-------------------------|--------------------------|-------------------------|
| 1) $10 + \square = 20$ | (2) $5 + \square = 20$  | (3) $8 + \square = 20$   | (4) $6 + \square = 20$  |
| 5) $19 + \square = 20$ | (6) $15 + \square = 20$ | (7) $13 + \square = 20$  | (8) $2 + \square = 20$  |
| 9) $9 + \square = 20$  | (10) $7 + \square = 20$ | (11) $16 + \square = 20$ | (12) $1 + \square = 20$ |
- 13) 10, 15, 12, 14, 1, 5, 7, 18, 11, 13, 4, 19
- 14) Your answer to this question needs to be discussed with your teacher and other students in this group

## Exercise 7

- |  |  |
|--|--|
| 1) $20 - 12$ or $20 - 12 = \square$ or $12 + \square = 20$ | compatible to 20                                       |
| 2) $8 + 15$ or $8 + 15 = \square$                          | don't add to 20, so not compatible                     |
| 3) $9 + 11$ or $9 + 11 = \square$                          | compatible to 20                                       |
| 4) $25 - 15$ or $25 - 15 = \square$ or $15 + \square = 25$ | don't add to 20, so not compatible                     |
| 5) $17 + 13$ or $17 + 13 = \square$                        | compatible to 30                                       |
| 6) $17 + 3 = 20$ , $17 + 20 = \square$                     | first part is compatible to 20, next part is "ten and" |
| 7) $20 - 11$ or $20 - 11 = \square$ or $11 + \square = 20$ | compatible to 20                                       |
| 8) $9 + 2 = 11$ , $9 + 11 = \square$                       | second part compatible to 20                           |
| 9) $20 - 8$ or $20 - 8 = \square$ or $8 + \square = 20$    | compatible to 20                                       |
| 10) $7 + 8 + \square = 20$ or $20 - 8 - 7 = \square$       | compatible to 20                                       |
| 11) $7 + 6 + 9$ or $7 + 6 + 9 = \square$                   | don't add to 20, so not compatible                     |
| 12) $18 + 2 = 20$ , $20 + 18 = \square$                    | first part is compatible to 20, next part is "ten and" |

## Exercise 8

- 1)  $30 + 20 = 50$ , yes they will get the \$10
- 2)  $41 + 7 < 50$ , no they will not get the \$10
- 3)  $10 + 25 + 15 + 10 = 60$ , they will get \$10
- 4)  $50 - 35$  or  $50 - 35 = \square$  or  $35 + \square = 50$ , he needs to collect 15 more
- 5)  $40 - 31$  or  $40 - 31 = \square$  or  $31 + \square = 40$ , there are 9 left
- 6)  $47 + 13$  or  $47 + 13 = \square$ , there are 60 cows altogether
- 7)  $24 + 16$  or  $24 + 16 = \square$ , she has made 40 buns
- 8)  $70 - 25 - 30$  or  $70 - 25 - 30 = \square$  or  $\square + 25 + 30 = 70$ , there are 15 black beads
- 9)  $70 - 20 - 20 - 18$  or  $70 - 20 - 20 - 18 = \square$  or  $20 + 20 + 18 + \square = 70$ , there are 12 cans in the top layer
- 10)  $90 - 69$  or  $90 - 69 = \square$  or  $69 + \square = 90$ , there are 21 students studying economics

## Exercise 9

See the answer to exercise 4 number 1