Grade 7

PATTERNING AND ALGEBRA: ALGEBRAIC EXPRESSIONS

Play the Late Delivery game first! Levels 1 and 2 are recommended.
Click on *http://www.bbc.co.uk/education/mathsfile/shockwave/games/postie.html* or
go to *www.wiredmath.ca* for the link.

1. a. Write each of the following expression as a single number.

   i. $20 + 5$ ii. $15 \div 3$ iii. 11×9

   b. For each question in (a) write 3 *equivalent expressions* using 3 different operations.

2. Match up the *equivalent expressions* below:
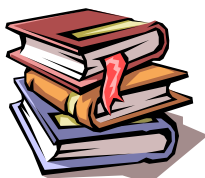
$4 + 3$	$55 - 52$
$1 + 2$	$2 \times 2 \times 2$
$6 \times 2 + 2$	$49 \div 7$
$16 \div 2$	7×2

> **Did You Know?**
>
> A cheetah can run 76 km/h. The fastest human can only run about 37 km/h!

3. The scale balances because the mass on the left side is equal to the mass on the right side. A number sentence can be written to describe the picture: $10 + 10 + 1 = 10 + 5 + 5 + 1$ or
$2 \times 10 + 1 = 2 \times 5 + 10 + 1$.

   a. Draw 3 different combinations of masses on a scale that would balance.

   b. Write a number sentence to describe each of the 3 new combinations.

4. a. Balance the scale using a combination of 10 g, 5 g and 1 g weights. Assume you have many different masses. Compare your solution with your classmates.

   b. Write an equivalent expression, which is different than the masses in the picture, to describe the total mass in each pan.
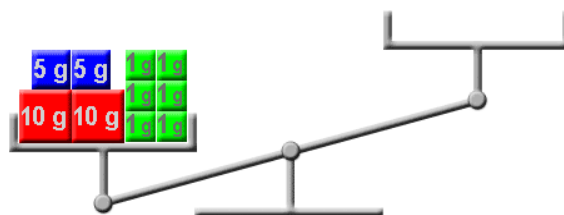
5. Simplify each expression.

   a. $3n + 4n - 2n$

   b. $4w - 3w + 7w$

   c. $2a + 10a + 5$

   d. $3b + 8 + 2b - 3$

   e. $8c \div 2$

   f. $4z \times 2 + 5$

   g. $4.04r \times 2 + 6$

   h. $(7 + 5x - 2x) \times 2$

   i. $d + 2d + 3d \times 2 + 9$

6. The sum of a number n and 20, is 25. Which equation below shows this relationship?

   a. $20 + n = 25$ b. $25n = 25$ c. $20 - n = 25$ d. $25 + n = 20$

7. Solve for x.

   a. $1 + x = 3$

   b. $x - 12 = 3$

   c. $7 + x = 7$

   d. $4x = 32$

   e. $3x + 1 = 16$

   f. $11x = 18 + 4$

   g. $5x + 3x = 16$

   h. $15 - x + 4 = 17$

   i. $4x + 2 = 6x$

   j. $4 + x = 9 - 2x$

8. If Jim works for 4 hours and earns \$32, how long will he need to work to earn \$40?


9. Tommy wants to buy a comic book that costs \$7. To earn money he decides to run a lemonade stand with his brother. Tommy and his brother earn \$10 and split the amount evenly between them.

   a. How much money did Tommy make?

   b. How much more money does Tommy need to earn to buy the comic book?

   c. Write an expression where x is the additional money Tommy needs.

10. How many circles are needed to balance the square?
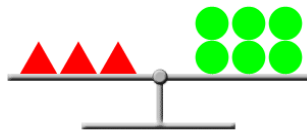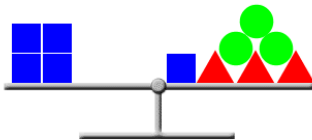
11. If Δ is an operation such that $a \Delta b = ab + a - b$, what does $4 \Delta 8$ equal?

CHALLENGE YOURSELF!

12. Two numbers are in the ratio 9 to 4. Their sum is 39. Find the smaller number.

13. Three consecutive integers have a sum. When the sum is divided in half it is equal to 24. Determine the three numbers?

14. The cafeteria charges $2.25 for a hamburger, $1.75 for fries, $1.00 for a salad and $1.25 for a drink. Dawn buys two hamburgers, one fry, one salad and two drinks.

    a. Write a mathematical expression to describe the situation.

    b. How much change does Dawn receive if she pays with a ten dollar bill?

15. There are 30 players on the hockey team. If there are 8 more boys on the team than girls, how many girls are on the team?

16. In a basketball game a player can score either two points for a close shot or three points for a long shot. If Jen scored 12 points in total, how many two-point and three-point baskets could Jen have made? Determine all possible answers.
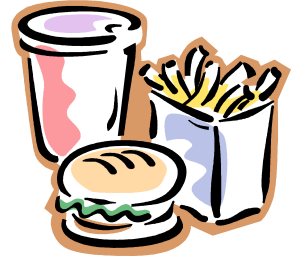
EXTENSIONS!

17. Chelsea and Kristen decide to have a race on a straight track. Since Kristen's car is faster, she agrees to give Chelsea a head start. At 12:00 noon, Chelsea starts driving her car at 60 km/h. Two hours later Kristen starts driving at 90 km/h.

    a. At what time will Kristen catch Chelsea?

    b. How far ahead will Kristen be at 10:00 pm?

18. Jim and his older brothers want to split on the cost of a new car. The car will cost $9000. If they include Jim's two younger brothers in the purchase, it will cost $750 less per person. How many brothers (including Jim) are in the family?