



## Patterns and Early Algebra

1 What rule turns each input into its output?

| Input | Output |
|-------|--------|
| 4     | 6      |
| 5     | 9      |
| 6     | 12     |
| 7     | 15     |
| 9     | 21     |

A

multiply by 5 then subtract 7

B

multiply by 3 then subtract 6

C

multiply by 6 then subtract 1

D

multiply by 3 then add 8

2 What rule turns each input into its output?

| Input | Output |
|-------|--------|
| 3     | 0      |
| 4     | 1      |
| 5     | 2      |
| 15    | 12     |
| 16    | 13     |

A

divide by 6

B

subtract 3

C

subtract 5

D

divide by 7



## Patterns and Early Algebra

3 What is the missing value in the table?

| Input | Output |
|-------|--------|
| 2     | 7      |
| 5     | 10     |
| 9     | ?      |
| 12    | 17     |
| 15    | 20     |

A

18

B

14

C

11

D

20

4 Choose the rule that describes this geometric pattern

**1, 2, 4, 8, 16, 32**

A Start at 1 and multiply by -1 for each term

B Start with 1 and 3. Add the prior two terms for each subsequent term

C Start at 1 and multiply by 0 for each term

D Start at 1 and multiply by 2 for each term

E Start at 1 and multiply by -2 for each term

F Start at 1 and subtract 2 for each term

5 Choose the rule that describes this increasing pattern

**2, 5, 8, 11**

A Start at 0 and add 3 for each term

B Start at 2 and add 3 for each term

C Start with 2 and 5. Add the prior two terms for each subsequent term

D Start at 2 and multiply by 3 for each term

E Start at 2 and subtract 3 for each term

F Start at 2 and add -1 for each term

6 Choose the rule that describes this pattern



A krueller, candy, then repeat

B donut, lollipop, cake, then repeat

7 Figure out the answer by using the correct order of operations

$$14 - (7 - 2) = ?$$

A

2

B

11

C

16

D

9

E

1

F

6



## Patterns and Early Algebra

8 What rule turns each input into its output?

| Input | Output |
|-------|--------|
| 12    | 3      |
| 13    | 4      |
| 16    | ?      |
| 17    | 8      |
| 21    | 12     |

A

divide by 4

B

multiply by 12

C

subtract 9

D

subtract 10

9 What rule turns each input into its output?

| Input | Output |
|-------|--------|
| 7     | 13     |
| 12    | ?      |
| 13    | 19     |
| 14    | 20     |
| 15    | 21     |

A

add 6

B

subtract 12

C

add 2

D

subtract 3



## Patterns and Early Algebra

**10** What rule turns each input into its output?

| Input | Output |
|-------|--------|
| 1     | 7      |
| 2     | 14     |
| 4     | ?      |
| 6     | 42     |
| 7     | 49     |

A

multiply by 10

B

multiply by 7

C

multiply by 6

D

multiply by 9

**11** Figure out the answer by using the correct order of operations

$$9 - (3 + 2) + 5 = ?$$

A

9

B

5

C

10

D

1

E

8

F

13

**12** Figure out the answer by using the correct order of operations

$$(8 + 2) + (7 - 3 + 4) = ?$$

A

24

B

0

C

18

D

27

E

15

F

14

**13** Figure out the answer by using the correct order of operations

$$4 + 10 \div 5 + 18 \div 3 = ?$$

A

7

B

19

C

11

D

0

E

9

F

12

**14** Figure out the answer by using the correct order of operations

$$63 \div (3 + 4) = ?$$

A

15

B

4

C

24

D

9

E

5

F

8



## Patterns and Early Algebra

- 15** Figure out the answer by using the correct order of operations

$$(9 + 3) \div 6 + 5 \times 7 = ?$$

|        |         |         |
|--------|---------|---------|
| A<br>3 | B<br>45 | C<br>41 |
| D<br>7 | E<br>4  | F<br>37 |

- 16** Find the term that would complete this increasing pattern in the missing space

**?, 5, 9, 13**

|         |        |         |
|---------|--------|---------|
| A<br>0  | B<br>1 | C<br>-3 |
| D<br>-2 | E<br>3 | F<br>4  |

- 17** Find the term that would be next in this increasing pattern

**2, 4, 6, ?**

|         |        |         |
|---------|--------|---------|
| A<br>8  | B<br>9 | C<br>3  |
| D<br>14 | E<br>4 | F<br>11 |

- 18** Find the number that balances the equation

$$29 - 2 - 1 = 25 - ? + 2$$

|         |         |        |
|---------|---------|--------|
| A<br>20 | B<br>40 | C<br>5 |
| D<br>2  | E<br>30 | F<br>1 |

- 19** Find the number that balances the equation

$$17 - 6 - 10 = ? - 2 - 7$$

|        |         |         |
|--------|---------|---------|
| A<br>6 | B<br>10 | C<br>14 |
| D<br>8 | E<br>1  | F<br>7  |

- 20** Choose the first values that this pattern rule would create

**Start at 3 and multiply by 4 for each term**

|                       |                     |
|-----------------------|---------------------|
| A<br>3, -1, -5, -9    | B<br>3, 12, 48, 192 |
| C<br>-1, -4, -16, -64 | D<br>5, 20, 80, 320 |
| E<br>3, 7, 10, 17     | F<br>3, 9, 27, 81   |

- 21** Which numbers follow this pattern rule?

**Start at 2 and add 3 for each term**

|              |                  |
|--------------|------------------|
| A<br>1, 1, 1 | B<br>2, 5, 8, 11 |
|--------------|------------------|

- 22** Which rule describes this type of pattern?

**Geometric**

- A Start at 1 and multiply by 2 for each term
- B Find that 8, 4 repeats and repeat those numbers



## Patterns and Early Algebra

**23** What type of pattern does this describe?

**Start at 1 and add 3 for each term**

A Increasing (Arithmetic)

B Repeating

**24** Find the item that would be next in this growing pattern



**25** Find the term that would complete this increasing pattern in the missing space

**1, 3, ?, 7, 9**

A 10

B 5

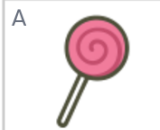
C 1

D 6

E 3

F 0

**26** What candy will be at  $n=16$  in this pattern



**27** Find the term that would be next in this repeating pattern

**9, 1, 4, 3, 9, 1, 4, 3, 9, 1, 4, 3, 9, ?**

A 4

B 9

C 3

D 1

**28** Find the number that balances the equation

$$14 + 5 = ? - 7$$

A 27

B 30

C 28

D 26

E 0

F 22

**29** Find the number that balances the equation

$$12 - 11 = 27 - 21 - ?$$

A 3

B 9

C 7

D 2

E 6

F 5

**30** Solve the one-step equation for  $x$ .

$$x + 5 = 18$$

A  $x = 13$

B  $x = 14$

C  $x = 12$

D  $x = 15$



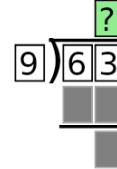
## Patterns and Early Algebra

**31** Solve for the variable in the equation

$$b - 6 = -3$$

|   |         |   |         |
|---|---------|---|---------|
| A | $b = 2$ | B | $b = 0$ |
| C | $b = 1$ | D | $b = 3$ |
| E | $b = 4$ | F | $b = 6$ |

**32** How many 9s fit into 63?



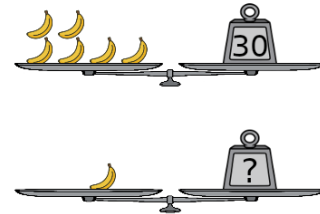
|   |    |   |   |   |    |
|---|----|---|---|---|----|
| A | 11 | B | 8 | C | 10 |
| D | 3  | E | 7 | F | 9  |

**33** What number can be put in the circle to make this equation correct?

$$7 \cdot \bigcirc = 35$$

|   |                |   |                |
|---|----------------|---|----------------|
| A | $\bigcirc = 5$ | B | $\bigcirc = 8$ |
| C | $\bigcirc = 7$ | D | $\bigcirc = 2$ |
| E | $\bigcirc = 6$ | F | $\bigcirc = 4$ |

**34** Which equations represent what these scales are showing



**35** Solve the one-step equation for x.

$$\frac{x}{2} = 2$$

|   |         |   |         |
|---|---------|---|---------|
| A | $x = 6$ | B | $x = 4$ |
| C | $x = 5$ | D | $x = 3$ |

**36** Solve this problem:

How many apples were eaten if a koala eats 45 grams of apples and each apple weighs 9 grams?

|   |   |   |    |   |    |
|---|---|---|----|---|----|
| A | 0 | B | 18 | C | 36 |
| D | 4 | E | 0  | F | 5  |

**37** Solve this problem:

A group of 9 kids each have a bag containing 5 pieces of candy. How many pieces of candy in total?

|   |    |   |    |   |    |
|---|----|---|----|---|----|
| A | 37 | B | 45 | C | 46 |
| D | -5 | E | 42 | F | 43 |

**38** Solve for the missing value

$$420 - 109 - ? - 120 = 82$$

|   |    |   |     |   |     |
|---|----|---|-----|---|-----|
| A | 88 | B | 130 | C | 94  |
| D | 79 | E | 118 | F | 109 |