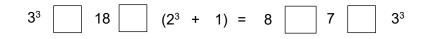## Higher Check In - 1.03 Combining arithmetic operations

Do not use a calculator for these questions.

1. Work out $3\left(9^2 - 2^4\right)$.

2. Insert each symbol +, −, × and ÷ to make the statement correct.

   30 ☐ 5 ☐ 4 ☐ 9 ☐ 3 = 13

3. Insert each symbol +, −, × and ÷ to complete the equation.

   3^3 ☐ 18 ☐ $(2^3 + 1)$ = 8 ☐ 7 ☐ 3^3

4. Insert brackets to make this statement true.

   $$11 - 5 \times 8 + 6 \div 2 = 66$$

5. Work out $2 \times 5^3 - 7(5+3)$.

6. Show that $1^2 + 2^2 + 3^2 + 4^2 + 5^2 = \dfrac{2 \times 5^3 + 3 \times 5^2 + 5}{6}$.

7. Show that the following can be made true by inserting one pair of brackets.

   $$\frac{-6 + 4 \times 2}{\left(\sqrt{\dfrac{72}{8}} - 1\right)^3} = 2^3 \times \left(7 - 3\ ^2 \times \sqrt{5 - 1}\right)^{-1}$$

8. Maya thinks that the answer to the expression $\sqrt{\left(12^2 + (12 - 7)^2\right)}$ is 17. Explain why her answer is incorrect.

9. Alana buys 5 bread rolls and 6 cakes. She gets £1.30 change from £20. If cakes are twice as expensive as bread rolls, how much would 2 bread rolls and 3 cakes cost?

10. Put these calculations in order of size, from smallest to biggest.

   $$\sqrt{\frac{2^6}{2(7-5)}} \qquad \frac{\sqrt{\left(8^2 - 6^2\right)}}{\sqrt{7}} \qquad \frac{\left(4^2 + 5\right)}{3\left(\sqrt{25} - 4\right)} \qquad \frac{7^2 - 6 \times 4}{\sqrt{\left(3^2 + 4^2\right)}}$$

Extension

Use five 8s and any mathematical operations to make the following totals.

$$8 \quad 8 \quad 8 \quad 8 \quad 8 \quad = \quad 1$$
$$8 \quad 8 \quad 8 \quad 8 \quad 8 \quad = \quad 2$$
$$8 \quad 8 \quad 8 \quad 8 \quad 8 \quad = \quad 3$$
$$8 \quad 8 \quad 8 \quad 8 \quad 8 \quad = \quad 4$$
$$8 \quad 8 \quad 8 \quad 8 \quad 8 \quad = \quad 5$$
$$8 \quad 8 \quad 8 \quad 8 \quad 8 \quad = \quad 6$$
$$8 \quad 8 \quad 8 \quad 8 \quad 8 \quad = \quad 7$$
$$8 \quad 8 \quad 8 \quad 8 \quad 8 \quad = \quad 8$$
$$8 \quad 8 \quad 8 \quad 8 \quad 8 \quad = \quad 9$$
$$8 \quad 8 \quad 8 \quad 8 \quad 8 \quad = \quad 10$$

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Answers

1. 195

2. $30 - 5 \times 4 + 9 \div 3 = 13$

3. $3^3 + 18 \div \left(2^3 + 1\right) = 8 \times 7 - 3^3$

4. $\left(11 - 5\right) \times \left(8 + 6 \div 2\right) = 66$

5. 194

6. $1^2 + 2^2 + 3^2 + 4^2 + 5^2 = 1 + 4 + 9 + 16 + 25 = 55$

   $$\frac{2 \times 5^3 + 3 \times 5^2 + 5}{6} = \frac{250 + 75 + 5}{6} = \frac{330}{6} = 55$$

7. $$\frac{-6 + 4 \times 2}{\left(\sqrt{\dfrac{72}{8}} - 1\right)^3} = 2^3 \times \left(\left(7 - 3\right)^2 \times \sqrt{5 - 1}\right)^{-1}$$

   $$\frac{2}{8} = \frac{8}{32}$$

8. $\sqrt{\left(12^2 + \left(12 - 7\right)^2\right)} = \sqrt{\left(12^2 + 5^2\right)} = \sqrt{144 + 25} = \sqrt{169} = 13$.

   Maya has worked out $\sqrt{\left(12 + 5\right)^2} = \sqrt{17^2} = 17$ which is incorrect.

9. $\dfrac{20 - 1.3}{5 + 2 \times 6} = 1.1$ so each bread roll costs £1.10 and each cake costs £2.20

   $2 \times 1.10 + 3 \times 2.20 = £8.80$

10. $\dfrac{\sqrt{\left(8^2 - 6^2\right)}}{\sqrt{7}} = 2$ $\sqrt{\dfrac{2^6}{2\left(7 - 5\right)}} = 4$ $\dfrac{7^2 - 6 \times 4}{\sqrt{\left(3^2 + 4^2\right)}} = 5$ $\dfrac{\left(4^2 + 5\right)}{3\left(\sqrt{25} - 4\right)} = 7$

Extension

E.g.

$$\frac{(8+8)}{8} - \frac{8}{8} = 1$$

$$\frac{8+8+8-8}{8} = 2$$

$$\frac{8+8}{8} + \frac{8}{8} = 3$$

$$\frac{8+8+8+8}{8} = 4$$

$$8 - \frac{8+8+8}{8} = 5$$

$$8 - \frac{8}{8} - \frac{8}{8} = 6$$

$$8 - 8 + 8 - \frac{8}{8} = 7$$

$$\frac{8 \times 8 \times 8}{8 \times 8} = 8$$

$$8 \times 8 \div 8 \div 8 + 8 = 9$$

$$\frac{8}{8} + 8 + \frac{8}{8} = 10$$

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Assessment Objective	Qu.	Topic	R	A	G
AO1	1	Carry out a calculation involving powers and brackets			
AO1	2	Choose the correct operation to complete a calculation			
AO1	3	Choose the correct operation to make a number statement correct			
AO1	4	Insert brackets to make a calculation correct			
AO1	5	Carry out a calculation involving powers and brackets			
AO2	6	Carry out steps in a calculation in the correct order			
AO2	7	Insert brackets to make a calculation correct			
AO2	8	Explain the steps required for the correct calculation			
AO3	9	Solve a problem in context using the correct order of operations			
AO3	10	Use the correct order of operations and then put the answers in order			