

Exercises: Arithmetic

1. Evaluate each of the following, without using your calculator.

- (a) 3^2
- (b) 8^3
- (c) 4^{-1}
- (d) $(\frac{1}{2})^2$
- (e) $(-8)^2$
- (f) $(-2)^3$
- (g) 3^{-2}
- (h) $(-3)^2$
- (i) -3^2

2. Use your calculator to find the following correct to 2 significant figures.

- (a) 7^6
- (b) 3.2^4
- (c) $(-3.2)^4$
- (d) 3.2^{-4}

3. Insert brackets, **where necessary**, in each of the following calculations to emphasise the order in which the calculations must be performed to obtain the given answers.

- (a) $3 + 5 \times 2 = 13$
- (b) $10^3 \times 3 = 3000$
- (c) $\frac{15+5}{3+7} = 2$
- (d) $6 - 4 + 2 = 4$
- (e) $2^2 + 3 \times 10^2 = 700$
- (f) $\frac{1}{3+4} - \frac{6}{7} = -\frac{5}{7}$
- (g) $32 + 2 \times 5^2 + 6 = 856$
- (h) $32 + 2 \times 5^2 + 6 = 1054$
- (i) $3 + 5 \times 2 = 16$
- (j) $1 + 2^2 + 3 \times 10^2 = 305$
- (k) $2^3 + 3^3 + 4^3 + 5^3 + 6^3 + 7^3 + 8^3 + 9^3 = 2024$

4. Evaluate the following expressions correct to: a) 2 significant figures, b) 2 decimal places.
 - (a) $\frac{3.67+2.98 \times (4.12^3+3.14^4)}{\sqrt{2.15 \times 1.44+5.91}}$
 - (b) $(2.95)^{-1.2} \times \frac{2}{\frac{1}{3} + \frac{2.4}{4.9}}$
5. (a) After carrying out a series of numerical operations a calculator gives the following answer: 1.917150743E-03. What number is this?
 (b) How would you expect the same calculator to represent the number 32190818670?
6. Use your calculator to evaluate the following correct to 4 decimal places.
 - (a) $\frac{9.81 \times 10^{-4} \times 4.65 \times 10^6}{3.13 \times 10^2}$
 - (b) $4.66 \times 10^4 + \frac{12.15 \times 10^2}{10.41 \times 10^{-3}}$
7. Evaluate the following fractions in their lowest possible form.
 - (a) $\frac{1}{3} + \frac{3}{8}$
 - (b) $\frac{4}{9} - \frac{2}{7}$
 - (c) $\frac{3}{4} - \frac{4}{5} + \frac{5}{5}$
 - (d) $\frac{4}{5} \times \frac{7}{16}$
 - (e) $\frac{\frac{5}{8}}{\frac{15}{16}}$
 - (f) $\left(\frac{2}{3} + \frac{4}{9}\right) \times \frac{6}{7}$
8. I have three investments, each initially of £3000. Over the period of three years the first increases by 23%, the second increases by £850, whilst the third decreases by 17%. How much do I have, in total, at the end of the investment period, and what is the total percentage change in my investment?
9. A sum of £500 increases at 5.6% per annum (year). How much is in the account after 3 years? How long before the invested sum reaches £1000?
10. Peter, Sarah, and Bashir share a house and decide to pay in to a monthly 'kitty' a certain amount of money to cover the purchase of basic foodstuffs. They decide that a total of £80 should be sufficient. However, some eat more than others and so it is decided that the monthly payments should be in the ratio Peter:Sarah:Bashir = 4: 3: 2. How much does each person pay per month?

Answers

1. Evaluate each of the following, without using your calculator.
 - (a) $3^2 = 9$
 - (b) $8^3 = 512$
 - (c) $4^{-1} = 0.25 = \frac{1}{4}$

- (d) $(\frac{1}{2})^2 = \frac{1}{4}$
 (e) $(-8)^2 = 64$
 (f) $(-2)^3 = -8$
 (g) $3^{-2} = -\frac{1}{9} = 0.\dot{1}$
 (h) $(-3)^2 = 9$
 (i) $-3^2 = -9$
2. Use your calculator to find the following correct to 2 significant figures.
- (a) $7^6 = 120000$ 2 s.f.
 (b) $3.2^4 = 110$ 2 s.f.
 (c) $(-3.2)^4 = 110$ 2 s.f.
 (d) $3.2^{-4} = 0.0095$ 2 s.f.
3. Insert brackets, **where necessary**, in each of the following calculations to emphasise the order in which the calculations must be performed to obtain the given answers.
- (a) $3 + 5 \times 2 = 13$
 (b) $10^3 \times 3 = 3000$
 (c) $\frac{15+5}{3+7} = 2$
 (d) $6 - 4 + 2 = 4$
 (e) $(2^2 + 3) \times 10^2 = 700$
 (f) $\frac{1}{3+4} - \frac{6}{7} = -\frac{5}{7}$
 (g) $(32 + 2) \times 5^2 + 6 = 856$
 (h) $(32 + 2) \times (5^2 + 6) = 1054$
 (i) $(3 + 5) \times 2 = 16$
 (j) $1 + 2^2 + 3 \times 10^2 = 305$
 (k) $2^3 + 3^3 + 4^3 + 5^3 + 6^3 + 7^3 + 8^3 + 9^3 = 2024$
4. Evaluate the following expressions correct to: a) 2 significant figures, b) 2 decimal places.
- (a) $\frac{3.67+2.98 \times (4.12^3+3.14^4)}{\sqrt{2.15 \times 1.44+5.91}}$: 170 to 2 s.f., 167.20 to 2 d.p..
 (b) $(2.95)^{-1.2} \times \frac{2}{\frac{1}{3} + \frac{2.4}{4.9}}$: 0.66 to both 2 s.f. and 2 d.p..
5. (a) After carrying out a series of numerical operations a calculator gives the following answer: 1.917150743E-03. What number is this? 0.001917150743
 (b) How would you expect the same calculator to represent the number 32190818670? 3.2190818670E10
6. Use your calculator to evaluate the following correct to 4 decimal places.
- (a) $\frac{9.81 \times 10^{-4} \times 4.65 \times 10^6}{3.13 \times 10^2} = 14.5740$ 4 d.p.
 (b) $4.66 \times 10^4 + \frac{12.15 \times 10^2}{10.41 \times 10^{-3}} = 163314.9674$ 4 d.p.

7. Evaluate the following fractions in their lowest possible form.

(a) $\frac{1}{3} + \frac{3}{8} = \frac{17}{24}$

(b) $\frac{4}{9} - \frac{2}{7} = \frac{10}{63}$

(c) $\frac{3}{4} - \frac{4}{5} + \frac{5}{5} = \frac{19}{20}$

(d) $\frac{4}{5} \times \frac{7}{16} = \frac{7}{20}$

(e) $\frac{\frac{5}{8}}{\frac{15}{16}} = \frac{2}{3}$

(f) $\left(\frac{2}{3} + \frac{4}{9}\right) \times \frac{6}{7} = \frac{20}{21}$

8. I have three investments, each initially of £3000. Over the period of three years the first increases by 23%, the second increases by £850, whilst the third decreases by 17%. How much do I have, in total, at the end of the investment period, and what is the total percentage change in my investment? £10030 = 1.114×9000 , an 11.4% increase.

9. A sum of £500 increases at 5.6% per annum (year). How much is in the account after 3 years? How long before the invested sum reaches £1000? £588.79, 13 years

10. Peter, Sarah, and Bashir share a house and decide to pay in to a monthly 'kitty' a certain amount of money to cover the purchase of basic foodstuffs. They decide that a total of £80 should be sufficient. However, some eat more than others and so it is decided that the monthly payments should be in the ratio Peter:Sarah:Bashir = 4: 3: 2. How much does each person pay per month? Peter: £35.56, Sarah: £26.67, Bashir: £17.78