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. Evalue the following expressions correct to: a) 2 significant figures, b) 2 decimal places.

   (a) $\frac{3.67+2.98\times(4.12^3+3.14^4)}{\sqrt{2.15\times1.44+5.91}}$

   (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) $\frac{9.81\times10^{-4}\times4.65\times10^6}{3.13\times10^2}$

   (b) $4.66\times10^4+\frac{12.15\times10^2}{10.41\times10^{-3}}$

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. Evalue the following expressions correct to: a) 2 significant figures, b) 2 decimal places.

   (a) $\frac{3.67+2.98\times(4.12^3+3.14^4)}{\sqrt{2.15\times1.44+5.91}}$: 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) $\frac{9.81\times10^{-4}\times4.65\times10^6}{3.13\times10^2} = 14.5740$ 4 d.p.

   (b) $4.66 \times 10^4 + \frac{12.15\times10^2}{10.41\times10^{-3}} = 163314.9674$ 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) $\frac{4}{5} \times \frac{7}{16} = \frac{7}{24}$
   (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 $= 1.114 \times 9000$, 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