Calculations with Numbers in Standard form

Student name: _____ Score: _____

1. $z = \dfrac{17x^2}{a-b}$.

(a) Find the value of z when $x = 12.5$, $a = 0.572$ and $b = 0.447$.
Write down your full calculator display. *[2 marks]*

(b) Write down your answer to part (a) in the form $a \times 10^k$, where $1 \le a < 10$, $k \in \mathbb{Z}$.

2. Let $m = 6.0 \times 10^3$ and $n = 2.4 \times 10^{-5}$.

Express each of the following in the form $a \times 10^k$, where $1 \le a < 10$ and $k \in \mathbb{Z}$.

(a) mn;

(b) $\dfrac{m}{n}$.

3. A rectangle has length 2.6×10^4 and width 1.9×10^4. Find each of the following, giving your answer in the form $a \times 10^k$, where $1 \le a < 10$ and $k \in \mathbb{Z}$.

(a) The area of the rectangle;

(b) The perimeter of the rectangle.

4. Given $x = 2.6 \times 10^4$ and $y = 5.0 \times 10^{-8}$, calculate the value of $w = x \times y$. Give your answer in the form $a \times 10^k$ where $1 \le a < 10$ and $k \in \mathbb{Z}$.

5. Let $x = 6.4 \times 10^7$ and $y = 1.6 \times 10^8$.

Find

(a) $\dfrac{x}{y}$

(b) $y - 2x$,

giving your answers in the form $a \times 10^k$ where $1 \le a < 10$ and $k \in \mathbb{Z}$.

6. A rectangle is 2680 cm long and 1970 cm wide.

Find the perimeter of the rectangle, giving your answer in the form $a \times 10^k$, where $1 \leq a < 10$ and $k \in \mathbb{Z}$. *[3 marks]*

7. A satellite travels around the Earth in a circular orbit 500 kilometres above the Earth's surface. The radius of the Earth is taken as 6400 kilometres.

(a) Write down the radius of the satellite's orbit. *[1 mark]*

(b) Calculate the distance travelled by the satellite in one orbit of the Earth. Give your answer correct to the nearest km. *[3 marks]*

(c) Write down your answer to (b) in the form $a \times 10^k$, where $1 \leq a < 10$, $k \in \mathbb{Z}$. *[2 marks]*

8. Ross is a star that is 82 414 080 000 000 km away from Earth. A spacecraft, launched from Earth, travels at 48 000 kmh^{-1} towards Ross.

(a) Calculate the **exact** time, in hours, for the spacecraft to reach the star Ross. *[2 marks]*

(b) Give your answer to part (a) in years. (Assume 1 year = 365 days) *[2 marks]*

(c) Give your answer to part (b) in the form $a \times 10^k$, where $1 \leq a < 10$ and $k \in \mathbb{Z}$. *[2 marks]*

9. Consider $c = 5200$ and $d = 0.0000037$.

(a) Write down the value of $r = c \times d$. *[1 mark]*

(b) Write down your value of r in the form $a \times 10^k$, where $1 \leq a < 10$ and $k \in \mathbb{Z}$. *[2 marks]*

10. Assume the Earth is a perfect sphere with radius 6371 km.

(a) Calculate the volume of the Earth in km^3. Give your answer in the form $a \times 10^k$, where $1 \leq a < 10$ and $k \in \mathbb{Z}$. [3]

The volume of the Moon is $2.1958 \times 10^{10} \text{km}^3$.

(b) Calculate how many times greater in volume the Earth is compared to the Moon. Give your answer correct to the nearest **integer**. [3]

11. The average radius of the orbit of the Earth around the Sun is 150 million kilometres.

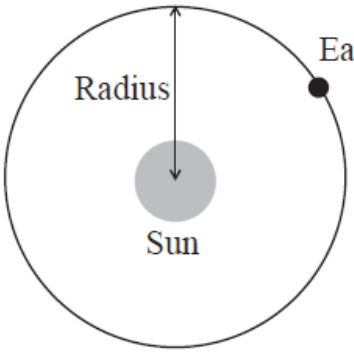

diagram not to scale

(a) Write down this radius, in kilometres, in the form $a \times 10^k$, where $1 \leq a < 10, k \in \mathbb{Z}$. *[2]*

The Earth travels around the Sun in one orbit. It takes one year for the Earth to complete one orbit.

(b) Calculate the distance, in kilometres, the Earth travels around the Sun in one orbit, assuming that the orbit is a circle. *[2]*

Today is Anna's 17th birthday.

(c) Calculate the total distance that Anna has travelled around the Sun, since she was born. *[2]*

1.1.1Numbers in Standard form

Student name: ANSWERS Score: _____

1. $z = \dfrac{17x^2}{a-b}$.

(a) Find the value of z when $x = 12.5$, $a = 0.572$ and $b = 0.447$.
Write down your full calculator display. 21250 *[2 marks]*

(b) Write down your answer to part (a) in the form $a \times 10^k$, where $1 \le a < 10$, $k \in \mathbb{Z}$.
2.125×10^4

2. Let $m = 6.0 \times 10^3$ and $n = 2.4 \times 10^{-5}$.

Express each of the following in the form $a \times 10^k$, where $1 \le a < 10$ and $k \in \mathbb{Z}$.

(a) mn; 1.44×10^{-1}

(b) $\dfrac{m}{n}$. 2.5×10^8

3. A rectangle has length 2.6×10^4 and width 1.9×10^4. Find each of the following, giving your answer in the form $a \times 10^k$, where $1 \le a < 10$ and $k \in \mathbb{Z}$.

(a) The area of the rectangle; 4.94×10^8

(b) The perimeter of the rectangle. 9.0×10^4

4. Given $x = 2.6 \times 10^4$ and $y = 5.0 \times 10^{-8}$, calculate the value of $w = x \times y$. Give your answer in the form $a \times 10^k$ where $1 \le a < 10$ and $k \in \mathbb{Z}$.
1.3×10^{-3}

5. Let $x = 6.4 \times 10^7$ and $y = 1.6 \times 10^8$.

Find

(a) $\dfrac{x}{y}$ 4.0×10^{-1}

(b) $y - 2x$, 3.2×10^7

giving your answers in the form $a \times 10^k$ where $1 \le a < 10$ and $k \in \mathbb{Z}$.

6. A rectangle is 2680 cm long and 1970 cm wide.

Find the perimeter of the rectangle, giving your answer in the form $a \times 10^k$, where $1 \le a < 10$ and $k \in \mathbb{Z}$. *[3 marks]*

9.3×10^3

7. A satellite travels around the Earth in a circular orbit 500 kilometres above the Earth's surface. The radius of the Earth is taken as 6400 kilometres.

(a) Write down the radius of the satellite's orbit. *[1 mark]*

6900

(b) Calculate the distance travelled by the satellite in one orbit of the Earth. Give your answer correct to the nearest km. *[3 marks]*

43354

(c) Write down your answer to (b) in the form $a \times 10^k$, where $1 \le a < 10$, $k \in \mathbb{Z}$. *[2 marks]*

4.34×10^4

8. Ross is a star that is 82 414 080 000 000 km away from Earth. A spacecraft, launched from Earth, travels at 48 000 kmh^{-1} towards Ross.

(a) Calculate the **exact** time, in hours, for the spacecraft to reach the star Ross. *[2 marks]*

1 716 960 000

(b) Give your answer to part (a) in years. (Assume 1 year = 365 days) *[2 marks]*

196 000

(c) Give your answer to part (b) in the form $a \times 10^k$, where $1 \le a < 10$ and $k \in \mathbb{Z}$. *[2 marks]*

1.96×10^5

9. Consider $c = 5200$ and $d = 0.0000037$.

(a) Write down the value of $r = c \times d$. *[1 mark]*

0.01924

(b) Write down your value of r in the form $a \times 10^k$, where $1 \le a < 10$ and $k \in \mathbb{Z}$. *[2 marks]*

1.924×10^{-2}

10. Assume the Earth is a perfect sphere with radius 6371 km.

(a) Calculate the volume of the Earth in km^3. Give your answer in the form $a \times 10^k$, where $1 \le a < 10$ and $k \in \mathbb{Z}$. [3]

1.08×10^{12}

The volume of the Moon is $2.1958 \times 10^{10} \text{km}^3$.

(b) Calculate how many times greater in volume the Earth is compared to the Moon. Give your answer correct to the nearest **integer**. [3]

49.3

11. The average radius of the orbit of the Earth around the Sun is 150 million kilometres.

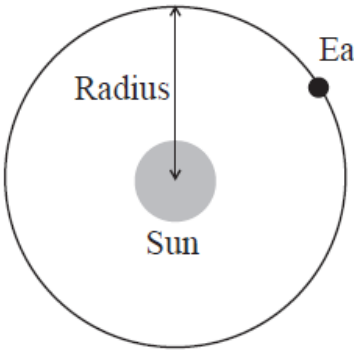

diagram not to scale

(a) Write down this radius, in kilometres, in the form $a \times 10^k$, where $1 \leq a < 10, k \in \mathbb{Z}$. *[2]*

1.5×10^8

The Earth travels around the Sun in one orbit. It takes one year for the Earth to complete one orbit.

(b) Calculate the distance, in kilometres, the Earth travels around the Sun in one orbit, assuming that the orbit is a circle. *[2]*

9.42×10^8

Today is Anna's 17th birthday.

(c) Calculate the total distance that Anna has travelled around the Sun, since she was born. *[2]*

1.60×10^{10}