Firrhill High School	N4 N5	Space		**4.** Distances in Space

Section A

1. Why do we measure distances in space in light years?

2. Name the planet furthest away from earth in the solar system.

Section B

1. What is a 'light year' a measure of?

2. Show how to calculate the number of seconds in a year.

3. Convert one light year to meters, **show your working**.

Section C

1. The distance from the Sun to the star Sirius is 8·6 light years.
   This distance is equivalent to
   A. $2{\cdot}2 \times 10^{14}$ m
   B. $1{\cdot}4 \times 10^{15}$ m
   C. $3{\cdot}4 \times 10^{15}$ m
   D. $8{\cdot}1 \times 10^{16}$ m
   E. $9{\cdot}5 \times 10^{16}$ m

2. The distance from the Sun to Proxima Centauri is 4·3 light years.
   This distance is equivalent to
   A. $1{\cdot}4 \times 10^{8}$ m
   B. $1{\cdot}6 \times 10^{14}$ m
   C. $6{\cdot}8 \times 10^{14}$ m
   D. $9{\cdot}5 \times 10^{15}$ m
   E. $4{\cdot}1 \times 10^{16}$ m

3. Bernard's star is 6 light years away.
   How long does it take like to travel this distance?
   A. 1.8×10^{6} s
   B. 7.5×10^{14} s
   C. 6 years
   D. 2.7×10^{16} s
   E. 12 years

4. Light travels from a distance star to earth. The star is 23 light years away.
   What speed does the light travel at?
   A. 23 ms^{-1}
   B. 4.5×10^{15} ms^{-1}
   C. 1.4×10^{16} ms^{-1}
   D. 3×10^{8} ms^{-1}
   E. 23×10^{21} ms^{-1}

5. It takes 8.9 years for light produced on Carinae V602 to reach the sun.
   If Star X is 30 times as far from the sun as Carinae V602 is, how far is Star X from the sun, to the nearest light year?
   A. 267
   B. 5358
   C. 632
   D. 68
   E. 1024

Section D

1. The star Betelgeuse is 500 light years from Earth.

a) Explain the term *light year*. **1**

b) Calculate the distance to Betelgeuse. **3**

2. Within our solar system distances are often measured in astronomical units (AU).

1 AU = $1{\cdot}50 \times 10^{11}$ m.

Mars orbits the Sun at an average distance of 1·52 AU

a) Determine the average distance, in metres, at which Mars orbits the Sun. **1**

b) Calculate the average time for light from the Sun to reach Mars. **3**

3. The table below gives information about planets that orbit the Sun.

Planet	***Distance from the Sun* (Gm)**	***Period* (days)**	***Mass* (Earth masses)**
Earth	150	365	1
Jupiter	780		318
Mars	228	687	0.11
Mercury	58	88	0.06
Saturn	1430	10 760	95
Venus	110	225	0.82

a) Give an approximate value, in days, for the period of Jupiter. **1**

b) Calculate the time taken for light from the Sun to reach Saturn. **3**

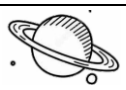
4. A star is 97 light-years from Earth.

a) State what is meant by the term light-year. **1**

b) Calculate the distance, in metres, from the star to Earth. **3**

5. The star Wolf 359 is at a distance of 7·8 light-years from Earth. A radio signal from Wolf 359 is detected by a radio telescope on Earth.

Calculate the distance, in metres, from Wolf 359 to Earth. **3**

Firrhill High School	N4 N5	Space		**4.** Distances in Space