Problem Solving 1

When sound travels through a gas, its speed depends primarily on the density of the medium. The less dense the medium, the faster the speed will be. The following table shows the approximate speed of sound, measured in meters per second, when traveling through carbon dioxide, helium, and hydrogen.

No	Medium	Speed (m/s)
1	Carbon Dioxide	258
2	Helium	972
3	Hydrogen	1270

Write a C++ program that asks the user to choose one of these three gases and enters the duration (in seconds) of the sound travels through the medium. The program should then report the distance (in meters) the sound has travelled.

The program should also cater for the following input validation:

- Only the three gases are allowed to choose from. Otherwise, the program should prompt an error message and terminate.
- Only positive value up to 30 seconds is allowable for the travel duration. Other than this range, the program should prompt an error message and terminate.

Example Run 1

```
   1. Carbon Dioxide
   2. Helium
   3. Hydrogen
Choose the medium type by entering a number as shown above: 1
Enter the travel duration: 25
Result: The sound has travelled 6450 meters.
```

Example Run 2

```
   1. Carbon Dioxide
   2. Helium
   3. Hydrogen
Choose the medium type by entering a number as shown above: 1
Enter the travel duration: 30
Result: The sound has travelled 7740 meters.
```

Example Run 3

```
   1. Carbon Dioxide
   2. Helium
   3. Hydrogen
Choose the medium type by entering a number as shown above: 5
ERROR: The medium type is invalid. Program ends.
```

Example Run 4

```
   1. Carbon Dioxide
   2. Helium
   3. Hydrogen
Choose the medium type by entering a number as shown above: 1
Enter the travel duration: 40
ERROR: The duration is out of range. Program ends.
```

Example Run 5

```
   1. Carbon Dioxide
   3. Helium
   3. Hydrogen
Choose the medium type by entering a number as shown above: 1
Enter the travel duration: 0
ERROR: The duration is out of range. Program ends.
```

Figure 1: Example Runs. *Note:* The underlined texts indicate input from the user