

UPPER AND LOWER BOUNDS

Task 1 – Work out the lower and upper bounds of each of the following numbers.

- 1) A number is 240, correct to the nearest 10.

$$10 \div 2 = 5$$

$$\text{Lower bound} = 240 - 5 = 235$$

$$\text{Upper bound} = 240 + 5 = 245$$

- 2) A number is 700, correct to the nearest 100.

$$100 \div 2 = 50$$

$$\text{Lower bound} = 700 - 50 = 650$$

$$\text{Upper bound} = 700 + 50 = 750$$

- 3) A number is 95, correct to the nearest 5.

$$5 \div 2 = 2.5$$

$$\text{Lower bound} = 95 - 2.5 = 92.5$$

$$\text{Upper bound} = 95 + 2.5 = 97.5$$

- 4) A number is 12000, correct to the nearest 1000.

$$1000 \div 2 = 500$$

$$\text{Lower bound} = 12000 - 500 = 11500$$

$$\text{Upper bound} = 12000 + 500 = 12500$$

- 5) A number is 480, correct to the nearest 10.

$$10 \div 2 = 5$$

$$\text{Lower bound} = 480 - 5 = 475$$

$$\text{Upper bound} = 480 + 5 = 485$$

- 6) A number is 135, correct to the nearest 5.

$$5 \div 2 = 2.5$$

$$\text{Lower bound} = 135 - 2.5 = 132.5$$

$$\text{Upper bound} = 135 + 2.5 = 137.5$$

- 7) A number is 2100, correct to the nearest 100.

$$100 \div 2 = 50$$

$$\text{Lower bound} = 2100 - 50 = 2050$$

$$\text{Upper bound} = 2100 + 50 = 2150$$

- 8) A number is 45000, correct to the nearest 1000.

$$1000 \div 2 = 500$$

$$\text{Lower bound} = 45000 - 500 = 44500$$

$$\text{Upper bound} = 45000 + 500 = 45500$$

- 9) A number is 120, correct to the nearest 10.

$$10 \div 2 = 5$$

$$\text{Lower bound} = 120 - 5 = 115$$

$$\text{Upper bound} = 120 + 5 = 125$$

- 10) A number is 65, correct to the nearest 5.

$$5 \div 2 = 2.5$$

$$\text{Lower bound} = 65 - 2.5 = 62.5$$

$$\text{Upper bound} = 65 + 2.5 = 67.5$$

Task 2 – Work out the lower and upper bounds of each of the following numbers.

- 11) A number is 8.92, correct to 2 decimal places.

$$0.01 \div 2 = 0.005$$

$$\text{Lower bound} = 8.92 - 0.005 = 8.915$$

$$\text{Upper bound} = 8.92 + 0.005 = 8.925$$

- 12) A number is 2.748, correct to 3 decimal places.

$$0.001 \div 2 = 0.0005$$

$$\text{Lower bound} = 2.748 - 0.0005 = 2.7475$$

$$\text{Upper bound} = 2.748 + 0.0005 = 2.7485$$

- 13) A number is 0.3, correct to 1 decimal place.

$$0.1 \div 2 = 0.05$$

$$\text{Lower bound} = 0.3 - 0.05 = 0.25$$

$$\text{Upper bound} = 0.3 + 0.05 = 0.35$$

- 14) A number is 7.40, correct to 2 decimal places.

$$0.01 \div 2 = 0.005$$

$$\text{Lower bound} = 7.40 - 0.005 = 7.395$$

$$\text{Upper bound} = 7.40 + 0.005 = 7.405$$

- 15) A number is 11, correct to the nearest unit.

$$1 \div 2 = 0.5$$

$$\text{Lower bound} = 11 - 0.5 = 10.5$$

$$\text{Upper bound} = 11 + 0.5 = 11.5$$

- 16) A number is 5.0, correct to 1 decimal place.

$$0.1 \div 2 = 0.05$$

$$\text{Lower bound} = 5.0 - 0.05 = 4.95$$

$$\text{Upper bound} = 5.0 + 0.05 = 5.05$$

17) A number is 3.67, correct to 2 decimal places.

$$0.01 \div 2 = 0.005$$

$$\text{Lower bound} = 3.67 - 0.005 = 3.665$$

$$\text{Upper bound} = 3.67 + 0.005 = 3.675$$

18) A number is 9.301, correct to 3 decimal places.

$$0.001 \div 2 = 0.0005$$

$$\text{Lower bound} = 9.301 - 0.0005 = 9.3005$$

$$\text{Upper bound} = 9.301 + 0.0005 = 9.3015$$

19) A number is 15, correct to the nearest unit.

$$1 \div 2 = 0.5$$

$$\text{Lower bound} = 15 - 0.5 = 14.5$$

$$\text{Upper bound} = 15 + 0.5 = 15.5$$

20) A number is 4.7, correct to 1 decimal place.

$$0.1 \div 2 = 0.05$$

$$\text{Lower bound} = 4.7 - 0.05 = 4.65$$

$$\text{Upper bound} = 4.7 + 0.05 = 4.75$$

Task 3 – Work out the lower and upper bounds of each of the following numbers.

21) A number is 700, correct to 1 significant figure.

1st significant figure is in the hundreds

$$100 \div 2 = 50$$

$$\text{Lower bound} = 700 - 50 = 650$$

$$\text{Upper bound} = 700 + 50 = 750$$

22) A number is 4300, correct to 2 significant figures.

2nd significant figure is in the hundreds

$$100 \div 2 = 50$$

$$\text{Lower bound} = 4300 - 50 = 4250$$

$$\text{Upper bound} = 4300 + 50 = 4350$$

23) A number is 0.008, correct to 1 significant figure.

1st significant figure is in the thousandths

$$0.001 \div 2 = 0.0005$$

$$\text{Lower bound} = 0.008 - 0.0005 = 0.0075$$

$$\text{Upper bound} = 0.008 + 0.0005 = 0.0085$$

24) A number is 62, correct to 2 significant figures.

2nd significant figure is in the units

$$1 \div 2 = 0.5$$

$$\text{Lower bound} = 62 - 0.5 = 61.5$$

$$\text{Upper bound} = 62 + 0.5 = 62.5$$

25) A number is 9.4, correct to 2 significant figures.

2nd significant figure is in the tenths

$$0.1 \div 2 = 0.05$$

$$\text{Lower bound} = 9.4 - 0.05 = 9.35$$

$$\text{Upper bound} = 9.4 + 0.05 = 9.45$$

26) A number is 0.73, correct to 2 significant figures.

2nd significant figure is in the hundredths

$$0.01 \div 2 = 0.005$$

$$\text{Lower bound} = 0.73 - 0.005 = 0.725$$

$$\text{Upper bound} = 0.73 + 0.005 = 0.735$$

27) A number is 12000, correct to 3 significant figures.

3rd significant figure is in the hundreds

$$100 \div 2 = 50$$

$$\text{Lower bound} = 12000 - 50 = 11950$$

$$\text{Upper bound} = 12000 + 50 = 12050$$

28) A number is 4.06, correct to 3 significant figures.

3rd significant figure is in the hundredths

$$0.01 \div 2 = 0.005$$

$$\text{Lower bound} = 4.06 - 0.005 = 4.055$$

$$\text{Upper bound} = 4.06 + 0.005 = 4.065$$

Task 4

29) The weight of a dog is 36 kg, correct to the nearest kg. Work out the lower bound of the dog's weight.

$$1 \div 2 = 0.5$$

$$\text{Lower bound} = 36 - 0.5 = 35.5 \text{ kg}$$

30) The volume of a tank is 4200 litres, correct to the nearest 100 litres. Work out the lower bound of the volume.

$$100 \div 2 = 50$$

$$\text{Lower bound} = 4200 - 50 = 4150 \text{ litres}$$

31) A plank is 320 cm long, correct to the nearest 10 cm. Work out the upper bound of the length.

$$10 \div 2 = 5$$

$$\text{Upper bound} = 320 + 5 = 325 \text{ cm}$$

32) A train journey time is 140 minutes, correct to the nearest 5 minutes. Work out the lower bound of the time.

$$5 \div 2 = 2.5$$

$$\text{Lower bound} = 140 - 2.5 = 137.5 \text{ minutes}$$

33) The cost of a phone is £560, correct to the nearest £10. Work out the lower bound of the cost.

$$10 \div 2 = 5$$

$$\text{Lower bound} = 560 - 5 = \text{£}555$$

34) The speed of a van is 95 km/h, correct to the nearest 5 km/h. Work out the difference between the upper and lower bound of the speed. Then, state one observation.

$$5 \div 2 = 2.5$$

$$\text{Lower bound} = 95 - 2.5 = 92.5$$

$$\text{Upper bound} = 95 + 2.5 = 97.5$$

$$97.5 - 92.5 = 5$$

The difference between the upper and lower bound is equal to 5; this is equal to the place value the speed was rounded to.

35) A person's height is given as 1.7 metres when rounded. The lower bound of their height is 1.65 m. To which place value was the height rounded?

$$1.7 - 1.65 = 0.05$$

$$0.05 \times 2 = 0.1$$

Nearest tenths (or 1 decimal place)