EXAM UNIT 2 (NUMBERS)

Name: _____

Remember: in each question, write the steps you have taken to reach the solution.

1) Classify the following numbers and arrange them in ascending order: (1.5p)

$$-\frac{3}{2},\quad -1.050550555....,\quad -\sqrt{2},\quad -1.0\widehat{5},\quad -1.050505.....$$

2) Work out (expressing each decimal number as a fraction): (1.5p)

$3.0\widehat{3} - 2 \times 1.35 + 0.1\widehat{06} =$

3) Complete (giving the answer with 3 s.f.): (2p)

Decimal	Standard form	Decimal	Standard form
23452		1278000000	
0.0072849		0.000009231	
	3.15×10^{7}		1.157×10^{-6}
	1.098×10^{-5}		5.103×10^{8}

4) Our galaxy weighs about 2.2×10^{41} kg, and the sun weighs about 1.989×10^{30} kg. How many suns are necessary to weigh as much as our galaxy? Write your result in standard form (with 2s.f.) (1p)

5) The mass of a hair is 0.000042 g (1p)

a) Write this number in standard form

b) Calculate the mass of 6×10^{5} hairs

6) The price of a laptop has risen from €350 to €420. Work out the percentage increase in the price. (1p)

7) A car was bought in 2007 for €18000. Each year it depreciates in value by 15%. What is the price of the car two years later? (1p)

8) The price of a jacket has been reduced by 20% in a sale. It now costs €96. What was the original price? (1p)

SOLUTIONS

1) Classify the following numbers and arrange them in ascending order:

$$-\frac{3}{2},\quad -1.050550555....,\quad -\sqrt{2},\quad -1.0\hat{5},\quad -1.050505.....$$

Rational numbers: $-\frac{3}{2},\quad -1.0\hat{5},\quad -1.050505.....$

Irrational numbers: $-1.050550555....,\quad -\sqrt{2}$

$$-\frac{3}{2} < -\sqrt{2} < -1.0\hat{5} < -1.050505..... < -1.050550555....$$

2) Work out (expressing each decimal number as a fraction):

$3.0\hat{3} - 2\times 1.35 + 0.1\hat{0}6 =$

$N = 3.033333..$

$100N = 303.3333.. \rightarrow 90N = 273 \Rightarrow N = \frac{273}{90} = \frac{91}{30}$; $1.35 = \frac{135}{100} = \frac{27}{20}$

$10N = 30.3333..$

$N = 0.1060606..$

$1000N = 106.060606.. \rightarrow 990N = 105 \Rightarrow N = \frac{105}{990} = \frac{7}{66}$

$10N = 1.060606..$

$3.0\hat{3} - 2\times 1.35 + 0.1\hat{0}6 = \frac{91}{30} - 2\times\frac{27}{20} + \frac{7}{66} = \frac{91}{30} - \frac{27}{10} + \frac{7}{66} =$ (m.c.m=330)

$= \frac{1001}{330} - \frac{891}{330} + \frac{35}{330} = \frac{145}{330} = \frac{29}{66} = 0.4\hat{3}\hat{9}$

3) Complete (giving the answer with 3 s.f.):

Decimal	Standard form	Decimal	Standard form
23452	2.35×10^{4}	1278000000	1.28×10^{9}
0.0072849	7.28×10^{-3}	0.000009231	9.23×10^{-6}
31500000	3.15×10^{7}	0.00000116	1.157×10^{-6}
0.000011	1.098×10^{-5}	510000000	5.103×10^{8}

4) Our galaxy weighs about 2.2×10^{41} kg, and the sun weighs about 1.989×10^{30} kg. How many suns are necessary to weigh as much as our galaxy? Write your result in standard form (with 2s.f.)

$2.2\times 10^{41} \div 1.989\times 10^{30} = 1.106083459\times 10^{11} = 1.11\times 10^{11}$ suns

5) The mass of a hair is 0.000042 g

a) Write this number in standard form $\rightarrow 4.2\times10^{-5}$

b) Calculate the mass of 6×10^{5} hairs

$6\times10^{5}\times4.2\times10^{-5}=25.2\ g$

6) The price of a laptop has risen from €350 to €420. Work out the percentage increase in the price.

$$\frac{350}{420}=\frac{100}{x}\Rightarrow 350x=100\times420\Rightarrow x=\frac{42000}{350}=120$$

So the percentage increase in the price was 20%

7) A car was bought in 2007 for €18000. Each year it depreciates in value by 15%. What is the price of the car two years later? 100%-15% = 85%

$18000\times0.85=15300$

$15300\times0.85=13005$ The price in 2009 is €13005

8) The price of a jacket has been reduced by 20% in a sale. It now costs €96. What was the original price? 100% - 20% = 80%

$$\frac{x}{96}=\frac{100}{80}\Rightarrow 80x=100\times96\Rightarrow x=\frac{9600}{80}=120$$

The original price was €120