

# Basic Skills Quizzes for S3 Exam

Each question corresponds to an entry in the “Basic Skills” list and there are three versions of the quiz so that you can re-visit any areas causing difficulty. Answers to the quizzes are given at the end of this document so you can check your work.

## Quiz 1

1) Round these numbers to two significant figures:-			
a) 789 456	b) 45.78954	c) 0.072159	
2) Simplify $\sqrt{98}$			
3) Add and subtract surds			
a) $3\sqrt{2} + 4\sqrt{2}$	b) $5\sqrt{3} - 2\sqrt{3}$		
4) Simplify and then add or subtract surds.			
$\sqrt{12} + \sqrt{75} - \sqrt{48}$			
5) Rationalise the denominator.			
$\frac{8}{\sqrt{2}}$			
6a) $a^7 \times a^3$	b) $a^8 \times a^{-3}$	c) $a^{-4} \times a^{-3}$	d) $a^2 \times a^{1/2}$
7a) $a^9 \div a^3$	b) $\frac{b^7}{b^2}$	c) $c^4 \div c^{-2}$	d) $d^2 \div d^{2/3}$
8a) Simplify $(a^5)^2$	b) Simplify $(b^{-3})^2$	c) Simplify $(c^6)^{1/2}$	
9a) Simplify $\frac{b^6 \times (b^5)^2}{b^4}$	b) Simplify $\frac{c^6 \times c^8}{c^2 \times c^3}$	c) Simplify $\frac{(d^3)^2}{d^5 \times d^7}$	
10) Write with positive indices.			
a) $q^{-4}$	b) $3q^{-5}$	c) $\frac{1}{5}q^{-3}$	d) $\frac{2}{3}q^{-6}$
11) Change fractional indices to roots.			
a) $v^{1/2}$	b) $v^{1/3}$	c) $v^{-1/3}$	d) $v^{4/3}$
12) Evaluate:-			
a) $3^{-3}$	b) $8^{1/3}$	c) $9^{3/2}$	d) $125^{-1/3}$
13) What is:-			
a) $6^0$	b) $t^0$	c) $3^1$	d) $f^1$

<b>14) Multiply out the brackets</b>			
<b>a)</b> $(x + 3)(x + 7)$	<b>b)</b> $(x - 3)(x - 7)$	<b>c)</b> $(x + 3)(x - 7)$	
<b>15) Multiply out the brackets</b>			
<b>a)</b> $(x + 5)^2$	<b>b)</b> $(x - 5)^2$	<b>c)</b> $(x + 5)(x - 5)$	
<b>16) Multiply out the brackets</b>			
<b>a)</b> $(5a + 4)(3a + 2)$	<b>b)</b> $(5b - 2)(3b - 2)$		
<b>17) Multiply out brackets</b>			
<b>a)</b> $(c + 4)(c^2 + 6c + 10)$	<b>b)</b> $(2c - 5)(2c^2 - 4c - 5)$		
<b>18) Factorise:-</b>			
<b>a)</b> $x^2 + 14x + 45$	<b>b)</b> $x^2 - 10x + 16$	<b>c)</b> $x^2 + 2x - 15$	
<b>19) Factorise: -</b>			
<b>a)</b> $x^2 - 16$	<b>b)</b> $4 - x^2$	<b>c)</b> $16x^2 - 81y^2$	<b>d)</b> $5x^2 - 45$
<b>20) Factorise: -</b>			
<b>a)</b> $5b^2 + 5b - 100$	<b>b)</b> $5c^2 - 13c + 6$		
<b>21) Write in the form <math>(x + a)^2 + b</math></b>			
<b>a)</b> $x^2 + 8x + 20$	<b>b)</b> $x^2 - 10x + 10$	<b>c)</b> $x^2 - 6x - 3$	
<b>22) Simplify algebraic fractions</b>			
<b>a)</b> $\frac{5p^3}{15rp^2}$	<b>b)</b> $\frac{x^2+7x+12}{x^2-16}$	<b>c)</b> $\frac{x^2+4x}{x^2+9x+20}$	
<b>23) Add algebraic fractions</b>			
<b>a)</b> $\frac{7}{p} + \frac{2q}{3}$	<b>b)</b> $\frac{c+1}{c+2} + \frac{c-4}{c-5}$		
<b>24) Subtract algebraic fractions</b>			
<b>a)</b> $\frac{7c}{3} - \frac{5}{d}$	<b>b)</b> $\frac{2x-3}{x+1} - \frac{3x-2}{x-3}$		
<b>25) Multiply algebraic fractions</b>			
<b>a)</b> $\frac{3c}{10d} \times \frac{5d}{c^2}$	<b>b)</b> $\frac{2x-3}{5} \times \frac{x+2}{x+3}$		
<b>26) Divide algebraic fractions.</b>			
<b>a)</b> $\frac{6a}{c} \div \frac{9c}{a^2}$	<b>b)</b> $\frac{a+2}{a} \div \frac{a+1}{a-3}$		
<b>27) Volume of a sphere or a hemisphere.</b>			
<b>a)</b> Find the volume of a sphere with a radius of 8cm.	<b>b)</b> Find the volume of a sphere with a diameter of 12cm.	<b>c)</b> Find the volume of a hemisphere with a radius of 20cm	

**28) Volume of a cone.**

**a)** Find the volume of a cone with a radius of 5cm and a height of 15cm.

**b)** Find the volume of a cone with a diameter of 10cm and a height of 8cm.

**29) Volume of a cylinder.**

**a)** Find the volume of cylinder with a radius of 6cm and a height of 18cm.

**b)** Find the volume of a cylinder with a diameter of 6cm and a height of 8cm.

**30) Volume of a pyramid**

**a)** The base of a pyramid is a square with side 6cm. If the pyramid is 8cm. high calculate its volume.

**b)** The base of a pyramid is a hexagon with an area of  $106\text{cm}^2$ . The pyramid has a height of 7 cm. Calculate the volume of this pyramid.

**31) Area of a sector**

**a)** A circle has a radius of 6cm. A sector is cut from this circle. If the angle at the centre of this sector is  $56^\circ$ , calculate its area.

**b)** A sector is cut from a circle with a diameter of 60cm. The angle at the centre of the sector is  $19^\circ$ . Calculate the area of the remaining circle.

**32) Length of an arc.**

**a)** A circle has a diameter of 24cm. Calculate the length of an arc which is subtended by an angle of  $210^\circ$ .

**b)** A sector with angle of  $34^\circ$  is removed from a circle with a radius of 8cm. Calculate the length of the curved part of this sector.

**33) Find the gradient of the straight line joining each pair of points.**

**a)** (2,3) and (5,18)

**b)** (2,1) and (6, -7)

**c)** (-7, -8) and (-2, -5)

**d)** (4,1) and (10, -2)

**34) Calculating percentage increase or decrease.**

- a) In a year the population of a town increased from 5678 to 6664. Work out the percentage increase. Give your answer to two significant figures.
- b) In one year the number of pupils at a school fell from 1312 to 1246. Calculate the percentage decrease. Give your answer to two significant figures.

**35) Calculating repeated percentage increase or decrease.**

- a) The number of flights from an airport is expected to increase by 5% every year for the next three years. If there are currently 4000 flights a year from the airport, how many will there be in three years?
- b) The number of birds in a nature reserve is estimated at 8000. The number of birds is expected to drop by 11% each year for the next four years. How many birds will there be in the nature reserve in 4 years?

**36) Reversing a percentage increase or decrease.**

- a) After a rise of 2% John earns £33 150 a year. What did he earn before his pay was increased?
- b) Jan's new car cost her £18 414 because she managed to negotiate a 7% discount. What was the full price of the car?

**37) Mean**

Find the mean of the following numbers:-

47 49 55 66 78 88 93

**38) Standard deviation**

Calculate the standard deviation for the data below:-

91 94 95 100 105

**39) Write appropriate comments on mean and standard deviation**

Group 1 – Mean weight 81.6kg, Standard deviation 4.1kg

Group 2 – Mean weight 77.9kg, Standard deviation 2.8kg

## Quiz 2 (Answers at the end of this document)

1) Round these numbers to three significant figures:-			
a) 3 789 456	b) 42.71954	c) 0.021593	
2) Simplify $\sqrt{48}$			
3) Add and subtract surds			
a) $5\sqrt{3} + 4\sqrt{3}$	b) $6\sqrt{2} - \sqrt{2}$		
4) Simplify and then add or subtract surds.			
$\sqrt{50} + \sqrt{8} - \sqrt{18}$			
5) Rationalise the denominator.			
$\frac{15}{\sqrt{3}}$			
6a) $p^8 \times p^3$	b) $p^7 \times p^{-2}$	c) $p^{-5} \times p^{-2}$	d) $p^2 \times p^{1/3}$
7a) $a^9 \div a^3$	b) $\frac{b^7}{b^2}$	c) $c^4 \div c^{-2}$	d) $d^2 \div d^{2/3}$
8a) Simplify $(a^5)^2$	b) Simplify $(b^{-3})^2$	c) Simplify $(c^6)^{1/2}$	
9a) Simplify $\frac{b^6 \times (b^5)^2}{b^4}$	b) Simplify $\frac{c^6 \times c^8}{c^2 \times c^3}$	c) Simplify $\frac{(d^3)^2}{d^5 \times d^7}$	
10) Write with positive indices.			
a) $q^{-4}$	b) $3q^{-5}$	c) $\frac{1}{5}q^{-3}$	d) $\frac{2}{3}q^{-6}$
11) Change fractional indices to roots.			
a) $v^{1/2}$	b) $v^{1/3}$	c) $v^{-1/3}$	d) $v^{4/3}$
12) Evaluate:-			
a) $3^{-3}$	b) $8^{1/3}$	c) $9^{3/2}$	d) $125^{-1/3}$
13) What is:-			
a) $d^0$	b) $5^0$	c) $m^1$	d) $7^1$
14) Multiply out the brackets			
a) $(x + 1)(x + 8)$	b) $(x - 1)(x - 8)$	c) $(x + 1)(x - 8)$	
15) Multiply out the brackets			
a) $(x + 9)^2$	b) $(x - 9)^2$	c) $(x + 9)(x - 9)$	
16) Multiply out the brackets			
a) $(3a + 4)(3a + 5)$	b) $(5b - 3)(3b - 4)$		

**17) Multiply out brackets**

**a)**  $(d + 3)(d^2 + 6d + 8)$

**b)**  $(2f - 7)(2f^2 + 4f - 3)$

**18) Factorise:-**

**a)**  $x^2 + 15x + 56$

**b)**  $x^2 - 10x + 21$

**c)**  $x^2 + 2x - 24$

**19) Factorise: -**

**a)**  $x^2 - 64$

**b)**  $81 - x^2$

**c)**  $100b^2 - 49a^2$

**d)**  $3x^2 - 48$

**20) Factorise: -**

**a)**  $5g^2 + 15g + 10$

**b)**  $5c^2 + c - 6$

**21) Write in the form  $(x + a)^2 + b$**

**a)**  $x^2 + 6x + 20$

**b)**  $x^2 - 8x + 10$

**c)**  $x^2 - 10x - 2$

**22) Simplify algebraic fractions**

**a)**  $\frac{10p}{15rp^2}$

**b)**  $\frac{x^2+7x+12}{x^2-9}$

**c)**  $\frac{x^2+4x}{x^2+8x+16}$

**23) Add algebraic fractions**

**a)**  $\frac{7}{c} + \frac{2d}{5}$

**b)**  $\frac{f+1}{f+2} + \frac{f+4}{f-5}$

**24) Subtract algebraic fractions**

**a)**  $\frac{4f}{5} - \frac{5}{g}$

**b)**  $\frac{5x-3}{x+1} - \frac{3x-2}{x+3}$

**25) Multiply algebraic fractions**

**a)**  $\frac{3c}{10d} \times \frac{5d}{2c^2}$

**b)**  $\frac{2a-3}{7} \times \frac{a+2}{a+5}$

**26) Divide algebraic fractions.**

**a)**  $\frac{3a}{c} \div \frac{9c}{a^3}$

**b)**  $\frac{x+2}{x} \div \frac{x+1}{x-4}$

**27) Volume of a sphere or a hemisphere.**

**a)** Find the volume of a sphere with a radius of 7cm.

**b)** Find the volume of a sphere with a diameter of 26cm.

**c)** Find the volume of a hemisphere with a radius of 12cm

**28) Volume of a cone.**

**a)** Find the volume of a cone with a radius of 6cm and a height of 20cm.

**b)** Find the volume of a cone with a diameter of 14cm and a height of 6cm.

**29) Volume of a cylinder.**

**a)** Find the volume of cylinder with a radius of 16cm and a height of 28cm.

**b)** Find the volume of a cylinder with a diameter of 16cm and a height of 80cm.

**30) Volume of a pyramid**

**a)** The base of a pyramid is a square with side 9cm. If the pyramid is 10cm. high calculate its volume.

**b)** The base of a pyramid is a hexagon with an area of  $94\text{cm}^2$ . The pyramid has a height of 11 cm. Calculate the volume of this pyramid.

**31) Area of a sector**

**a)** A circle has a radius of 12cm. A sector is cut from this circle. If the angle at the centre of this sector is  $34^\circ$ , calculate its area.

**b)** A sector is cut from a circle with a diameter of 16cm. The angle at the centre of the sector is  $33^\circ$ . Calculate the area of the remaining circle.

**32) Length of an arc.**

**a)** A circle has a diameter of 14cm. Calculate the length of an arc which is subtended by an angle of  $177^\circ$ .

**b)** A sector with angle of  $67^\circ$  is removed from a circle with a radius of 18cm. Calculate the length of the curved part of this sector.

**33) Find the gradient of the straight line joining each pair of points.**

**a)** (2,3) and (6,15)

**b)** (2,1) and (8, -7)

**c)** (-5, -8) and (-2, -6)

**d)** (4,8) and (10, -4)

**34) Calculating percentage increase (or decrease)**

**a)** This year the cost of a ski pass is £55 per day. Last year it was £47.50. Calculate the percentage increase. Give your answer to three significant figures.

**b)** Last year a travel agency sold 560 holidays in Portamento. This year they only sold 313 holidays for this destination. Calculate the percentage decrease.

**35) Calculating repeated percentage increase or decrease.**

**a)** This year the mean price paid for a laptop is £450. This is expected to fall by 8% a year for the next three years. What will the mean price be in three years? Give your answer to the nearest pound.

**b)** The number of people living in Auldshuggle is 3400. New houses are planned and this number is expected to rise by 4% a year for the next three years. How many people will live there in three years? Round to 2 sig. figs.

**36) Reversing a percentage increase or decrease.**

**a)** When Liam reduced his working hours his wage fell by 45% to £445.50. What did Liam earn when he worked longer hours?

**b)** The number of pupils in a school has increased by 22% when they got a new building. Now 1586 pupils attend the school. How many pupils used to attend this school?

**37) Mean**

Find the mean of the following numbers:-

47 49 56 66 78 88

**38) Standard deviation**

Calculate the standard deviation for the data below, rounding your answer to 2 significant figures.

86 94 95 100 110

**39) Write appropriate comments on mean and standard deviation**

Town 1 – Mean cost of a coffee £1.96, Standard deviation 13.2p

Town 2 – Mean cost of a coffee £2.34, Standard deviation 28.9p

## Quiz 3 (Answers at the end of this document)

1) Round these numbers to two significant figures:-			
a) 389 456	b) 2.717954	c) 0.029312	
2) Simplify $\sqrt{108}$			
3) Add and subtract surds			
a) $2\sqrt{5} + \sqrt{5}$	b) $6\sqrt{2} - 4\sqrt{2}$		
4) Simplify and then add or subtract surds.			
$\sqrt{20} + \sqrt{125} - \sqrt{75}$			
5) Rationalise the denominator.			
$\frac{15}{\sqrt{5}}$			
6a) $h^4 \times h^5$	b) $h^8 \times h^{-3}$	c) $h^{-4} \times h^{-3}$	d) $h^3 \times h^{1/2}$
7a) $v^8 \div v^3$	b) $\frac{w^7}{w^5}$	c) $x^5 \div x^{-4}$	d) $y^2 \div y^{1/2}$
8a) Simplify $(f^2)^3$	b) Simplify $(g^{-3})^4$	c) Simplify $(h^8)^{1/2}$	
9a) Simplify $\frac{b^6 \times (b^5)^3}{b^{10}}$	b) Simplify $\frac{c^5 \times c^7}{c^2 \times c^3}$	c) Simplify $\frac{(d^3)^3}{d^5 \times d^6}$	
10) Write with positive indices.			
a) $d^{-5}$	b) $3d^{-7}$	c) $\frac{1}{5}d^{-4}$	d) $\frac{2}{3}d^{-5}$
11) Change fractional indices to roots.			
a) $a^{1/2}$	b) $a^{1/3}$	c) $a^{-1/4}$	d) $a^{2/3}$
12) Evaluate:-			
a) $5^{-2}$	b) $64^{1/2}$	c) $36^{3/2}$	d) $8^{-1/3}$
13) What is:-			
a) $e^0$	b) $7^0$	c) $k^1$	d) $17^1$
14) Multiply out the brackets			
a) $(x + 3)(x + 8)$	b) $(x - 3)(x - 8)$	c) $(x + 3)(x - 8)$	
15) Multiply out the brackets			
a) $(x + 3)^2$	b) $(x - 3)^2$	c) $(x + 3)(x - 3)$	
16) Multiply out the brackets			
a) $(5a + 2)(3a + 1)$	b) $(5b - 4)(2b - 3)$		



<b>17) Multiply out brackets</b>			
<b>a)</b> $(k + 7)(k^2 + 5k + 3)$	<b>b)</b> $(3f - 8)(2f^2 + 5f - 3)$		
<b>18) Factorise:-</b>			
<b>a)</b> $x^2 + 11x + 30$	<b>b)</b> $x^2 - 10x + 24$	<b>c)</b> $x^2 + 2x - 48$	
<b>19) Factorise: -</b>			
<b>a)</b> $x^2 - 100$	<b>b)</b> $1 - x^2$	<b>c)</b> $16a^2 - 9b^2$	<b>d)</b> $7x^2 - 175$
<b>20) Factorise: -</b>			
<b>a)</b> $7g^2 - 42g + 56$	<b>b)</b> $7c^2 + 30c + 8$		
<b>21) Write in the form <math>(x + a)^2 + b</math></b>			
<b>a)</b> $x^2 + 12x + 40$	<b>b)</b> $x^2 - 10x + 10$	<b>c)</b> $x^2 - 8x - 2$	
<b>22) Simplify algebraic fractions</b>			
<b>a)</b> $\frac{25r^2}{15rp^2}$	<b>b)</b> $\frac{x^2+8x+12}{x^2+4x+4}$	<b>c)</b> $\frac{x^2+4x}{x^2+10x+24}$	
<b>23) Add algebraic fractions</b>			
<b>a)</b> $\frac{2}{c} + \frac{7d}{5}$	<b>b)</b> $\frac{f-1}{f+2} + \frac{f+4}{f-3}$		
<b>24) Subtract algebraic fractions</b>			
<b>a)</b> $\frac{4f}{5} - \frac{3}{g}$	<b>b)</b> $\frac{2x+1}{x+1} - \frac{5x-3}{x+3}$		
<b>25) Multiply algebraic fractions</b>			
<b>a)</b> $\frac{3c}{10d} \times \frac{5d}{2c^3}$	<b>b)</b> $\frac{2a+3}{3} \times \frac{a-2}{a+5}$		
<b>26) Divide algebraic fractions.</b>			
<b>a)</b> $\frac{5a}{c} \div \frac{10c}{a^3}$	<b>b)</b> $\frac{x-2}{x-1} \div \frac{x+1}{x-4}$		
<b>27) Volume of a sphere or a hemisphere.</b>			
<b>a)</b> Find the volume of a sphere with a radius of 11cm.	<b>b)</b> Find the volume of a sphere with a diameter of 4cm.	<b>c)</b> Find the volume of a hemisphere with a radius of 4.5cm	
<b>28) Volume of a cone.</b>			
<b>a)</b> Find the volume of a cone with a radius of 3.8cm and a height of 10.2cm.	<b>b)</b> Find the volume of a cone with a diameter of 14.8cm and a height of 16.2cm.		
<b>29) Volume of a cylinder.</b>			
<b>a)</b> Find the volume of cylinder with a radius of 1.6cm and a height of 2.8cm.	<b>b)</b> Find the volume of a cylinder with a diameter of 6cm and a height of 8.5cm		
<b>30) Volume of a pyramid</b>			

**a)** The base of a pyramid is a square with side 11cm. If the pyramid is 13cm. high calculate its volume.

**b)** The base of a pyramid is a hexagon with an area of  $102.4\text{cm}^2$ . The pyramid has a height of 12.3 cm. Calculate the volume of this pyramid.

**31)** Area of a sector

**a)** A circle has a radius of 12.3cm. A sector is cut from this circle. If the angle at the centre of this sector is  $55^\circ$ , calculate its area.

**b)** A sector is cut from a circle with a diameter of 16.8cm. The angle at the centre of the sector is  $77^\circ$ . Calculate the area of the remaining circle.

**32)** Length of an arc.

**a)** A circle has a diameter of 14.75cm. Calculate the length of an arc which is subtended by an angle of  $78^\circ$ .

**b)** A sector with angle of  $28^\circ$  is removed from a circle with a radius of 11.2cm. Calculate the length of the curved part of this sector.

**33)** Find the gradient of the straight line joining each pair of points.

**a)** (2,3) and (7,23)

**b)** (2,1) and (8, -11)

**c)** (-8, -8) and (-2, -3)

**d)** (4,2) and (11, -4)

**34)** Calculating percentage increase (or decrease)

**a)** In a year the number of pupils in a school increased from 1324 to 1555. Calculate the percentage increase. Give your answer to three significant figures.

**b)** The cost of a holiday in Treviso was reduced from £345 a week to £299. Calculate the percentage decrease. Give your answer to three significant figures.

**35)** Calculating repeated percentage increase or decrease.

**a)** During a flood the level of a river is rising by 15% every hour. If the river was 2.80m deep at 3pm how deep will it be at 6pm? Give your answer to two significant figures.

**b)** The value of a flat decreased by 4% a year for 5 years. If the flat was originally valued at £120 000 how much is it worth now? Give your answer to 3 significant figures.

**36)** Reversing a percentage increase or decrease.

**a)** A tree's height increases by 3% in year to 25.2m. Calculate the height of the tree at the start of the year. Give your answer to three significant figures.

**b)** This year only 930 people stayed in a hotel. This was a fall of 65% from the year before. How many people stayed the year before? Give your answer to two significant figures.

**37)** Mean

Find the mean of the following numbers:-

45 49 55 66 78 88 92 94 99

**38)** Standard deviation

Calculate the standard deviation for the data below, rounding your answer to two significant figures :-

36 39 48 51 54 60

**39)** Write appropriate comments on mean and standard deviation

Company A – Mean number of passengers on a bus 23.4, standard deviation 4.5

Company B – Mean number of passengers on a bus 18.6, standard deviation 7.3

**Quiz 1 - ANSWERS**

<b>1a)</b> 790 000 <b>b)</b> 46 <b>c)</b> 0.072	<b>19a)</b> $(x + 4)(x - 4)$ <b>b)</b> $(2 + x)(2 - x)$ <b>c)</b> $(4x + 9y)(4x - 9y)$ <b>d)</b> $5(x + 3)(x - 3)$
<b>2)</b> $7\sqrt{2}$	<b>20a)</b> $5(b + 5)(b - 4)$ <b>b)</b> $(5c - 3)(c - 2)$
<b>3a)</b> $7\sqrt{2}$ <b>b)</b> $3\sqrt{3}$	<b>21a)</b> $(x + 4)^2 + 4$ <b>b)</b> $(x - 5)^2 - 15$ <b>c)</b> $(x - 3)^2 - 12$
<b>4)</b> $3\sqrt{3}$	<b>22a)</b> $\frac{p}{3r}$ <b>b)</b> $\frac{x+3}{x-3}$ <b>c)</b> $\frac{x}{x+5}$
<b>5)</b> $\frac{8}{\sqrt{2}} = \frac{8\sqrt{2}}{\sqrt{2}\sqrt{2}} = \frac{8\sqrt{2}}{2} = 4\sqrt{2}$	<b>23a)</b> $\frac{21+2pq}{3p}$ <b>b)</b> $\frac{2c^2-6c-13}{(c+2)(c-5)}$
<b>6a)</b> $a^{10}$ <b>b)</b> $a^5$ <b>c)</b> $a^{-7}$ <b>d)</b> $a^{\frac{5}{2}}$	<b>24a)</b> $\frac{7cd-15}{3d}$ <b>b)</b> $\frac{-x^2-10x+11}{(x+1)(x-3)}$
<b>7a)</b> $a^6$ <b>b)</b> $b^5$ <b>c)</b> $c^6$ <b>d)</b> $d^{\frac{4}{3}}$	<b>25a)</b> $\frac{3}{2c}$ <b>b)</b> $\frac{2x^2+x-6}{5x+15}$
<b>8a)</b> $a^{10}$ <b>b)</b> $b^{-6}$ <b>c)</b> $c^3$	<b>26a)</b> $\frac{2a^3}{3c^2}$ <b>b)</b> $\frac{a^2-a-6}{a^2+a}$
<b>9a)</b> $b^{12}$ <b>b)</b> $c^9$ <b>c)</b> $d^{-6}$	<b>27a)</b> $2145\text{cm}^3$ <b>b)</b> $905\text{cm}^3$ <b>c)</b> $16\,755\text{cm}^3$
<b>10a)</b> $\frac{1}{q^4}$ <b>b)</b> $\frac{3}{q^5}$ <b>c)</b> $\frac{1}{5q^3}$ <b>d)</b> $\frac{2}{3q^6}$	<b>28a)</b> $393\text{cm}^3$ <b>b)</b> $209\text{cm}^3$
<b>11a)</b> $\sqrt{v}$ <b>b)</b> $\sqrt[3]{v}$ <b>c)</b> $\frac{1}{\sqrt[3]{v}}$ <b>d)</b> $\sqrt[3]{v^4}$	<b>29a)</b> $2056\text{cm}^3$ <b>b)</b> $226\text{cm}^3$
<b>12a)</b> $\frac{1}{27}$ <b>b)</b> 2 <b>c)</b> 27 <b>d)</b> $\frac{1}{5}$	<b>30a)</b> $96\text{cm}^3$ <b>b)</b> $247\text{cm}^3$
<b>13a)</b> 1 <b>b)</b> 1 <b>c)</b> 3 <b>d)</b> f	<b>31a)</b> $17.6\text{cm}^2$ <b>b)</b> $2678\text{cm}^2$
<b>14a)</b> $x^2 + 10x + 21$ <b>b)</b> $x^2 - 10x + 21$ <b>c)</b> $x^2 - 4x - 21$	<b>32a)</b> 44cm <b>b)</b> 4.7cm
<b>15a)</b> $x^2 + 10x + 25$ <b>b)</b> $x^2 - 10x + 25$ <b>c)</b> $x^2 - 25$	<b>33a)</b> 5 <b>b)</b> -2 <b>c)</b> $\frac{3}{5}$ <b>d)</b> $-\frac{1}{2}$
<b>16a)</b> $15a^2 + 22a + 8$ <b>b)</b> $15b^2 - 16b + 4$	<b>34a)</b> 17% <b>b)</b> 5.0%
<b>17a)</b> $c^3 + 10c^2 + 34c + 40$ <b>b)</b> $4c^3 - 18c^2 + 10c + 25$	<b>35a)</b> 4630 <b>b)</b> 5019
<b>18a)</b> $(x + 5)(x + 9)$ <b>b)</b> $(x - 2)(x - 8)$ <b>c)</b> $(x + 5)(x - 3)$	<b>36a)</b> £32 500 <b>b)</b> £19 8000

**37)** Mean = 28

**38)** Standard deviation = 5.5

**39)** On average group 2 are lighter because their mean weight is lower.

(OR: On average group 1 are heavier because their mean weight is higher.)

There is less of a spread of weights in group 2 because their standard deviation is smaller.

(OR: There is more of a spread of weights in group 1 because their standard deviation is larger.)

**Quiz 2 - ANSWERS**

<b>1a)</b> 3 790 000 <b>b)</b> 42.7 <b>c)</b> 0.0219	<b>19a)</b> $(x + 8)(x - 8)$ <b>b)</b> $(9 + x)(9 - x)$ <b>c)</b> $(10b - 7a)(10b + 7a)$ <b>d)</b> $3(x + 4)(x - 4)$
<b>2)</b> $4\sqrt{3}$	<b>20a)</b> $5(g + 1)(g + 2)$ <b>b)</b> $(5c + 6)(c - 1)$
<b>3a)</b> $9\sqrt{3}$ <b>b)</b> $5\sqrt{2}$	<b>21a)</b> $(x + 3)^2 + 11$ <b>b)</b> $(x - 4)^2 - 6$ <b>c)</b> $(x - 5)^2 - 27$
<b>4)</b> $4\sqrt{2}$	<b>22a)</b> $\frac{2}{3rp}$ <b>b)</b> $\frac{x+4}{x-3}$ <b>c)</b> $\frac{x}{x+4}$
<b>5)</b> $\frac{15}{\sqrt{3}} = \frac{15\sqrt{3}}{\sqrt{3}\sqrt{3}} = \frac{15\sqrt{3}}{3} = 5\sqrt{3}$	<b>23a)</b> $\frac{35+2cd}{5c}$ <b>b)</b> $\frac{2f^2+2f+3}{(f+2)(f-5)}$
<b>6a)</b> $p^{11}$ <b>b)</b> $p^5$ <b>c)</b> $p^{-7}$ <b>d)</b> $p^{\frac{7}{3}}$	<b>24a)</b> $\frac{7fg-25}{5g}$ <b>b)</b> $\frac{2x^2+11x-7}{(x+1)(x-3)}$
<b>7a)</b> $a^6$ <b>b)</b> $b^5$ <b>c)</b> $c^6$ <b>d)</b> $d^{\frac{4}{3}}$	<b>25a)</b> $\frac{3}{4c}$ <b>b)</b> $\frac{2x^2+x-6}{7a+35}$
<b>8a)</b> $a^{10}$ <b>b)</b> $b^{-6}$ <b>c)</b> $c^3$	<b>26a)</b> $\frac{a^4}{9c^2}$ <b>b)</b> $\frac{x^2-2x-8}{x^2+x}$
<b>9a)</b> $b^{12}$ <b>b)</b> $c^9$ <b>c)</b> $d^{-6}$	<b>27a)</b> $1437\text{cm}^3$ <b>b)</b> $9203\text{cm}^3$ <b>c)</b> $3619\text{cm}^3$
<b>10a)</b> $\frac{1}{q^4}$ <b>b)</b> $\frac{3}{q^5}$ <b>c)</b> $\frac{1}{5q^3}$ <b>d)</b> $\frac{2}{3q^6}$	<b>28a)</b> $754\text{cm}^3$ <b>b)</b> $308\text{cm}^3$
<b>11a)</b> $\sqrt{v}$ <b>b)</b> $\sqrt[3]{v}$ <b>c)</b> $\frac{1}{\sqrt[3]{v}}$ <b>d)</b> $\sqrt[3]{v^{-4}}$	<b>29a)</b> $22\,519\text{cm}^3$ <b>b)</b> $16\,085\text{cm}^3$
<b>12a)</b> $\frac{1}{27}$ <b>b)</b> 2 <b>c)</b> 27 <b>d)</b> $\frac{1}{5}$	<b>30a)</b> $270\text{cm}^3$ <b>b)</b> $345\text{cm}^3$
<b>13a)</b> 1 <b>b)</b> 1 <b>c)</b> m <b>d)</b> 7	<b>31a)</b> $42.7\text{cm}^2$ <b>b)</b> $183\text{cm}^2$
<b>14a)</b> $x^2 + 9x + 8$ <b>b)</b> $x^2 - 9x + 8$ <b>c)</b> $x^2 - 7x - 8$	<b>32a)</b> 21.6cm <b>b)</b> 21.0cm
<b>15a)</b> $x^2 + 18x + 81$ <b>b)</b> $x^2 - 18x + 81$ <b>c)</b> $x^2 - 81$	<b>33a)</b> 3 <b>b)</b> $-\frac{4}{3}$ <b>c)</b> 2 <b>d)</b> -2
<b>16a)</b> $9a^2 + 27a + 20$ <b>b)</b> $15b^2 - 29b + 12$	<b>34a)</b> 15.8% <b>b)</b> 44%
<b>17a)</b> $d^3 + 9d^2 + 26d + 24$ <b>b)</b> $4f^3 - 6f^2 - 34f + 21$	<b>35a)</b> £350 <b>b)</b> 3 700
<b>18a)</b> $(x + 7)(x + 8)$ <b>b)</b> $(x - 7)(x - 3)$ <b>c)</b> $(x + 6)(x - 4)$	<b>36a)</b> £810 <b>b)</b> 1 300

**37)** Mean = 64

**38)** Standard deviation = 8.8

**39)** On average coffee is more expensive in Town 2 because the mean price is higher.

(OR: On average coffee is cheaper in Town 1 because the mean price is lower.)

There is a wider spread of prices in Town 2 because the standard deviation is larger.

(OR: There is less of a spread of prices in Town 1 because the standard deviation is smaller)

**Quiz 3 - ANSWERS**

<b>1a)</b> 390 00 <b>b)</b> 2.7 <b>c)</b> 0.029	<b>19a)</b> $(x + 10)(x + 10)$ <b>b)</b> $(1 + x)(1 - x)$ <b>c)</b> $(4a - 3b)(14a + 3b)$ <b>d)</b> $7(x + 5)(x - 5)$
<b>2)</b> $7\sqrt{2}$	<b>20a)</b> $7(g - 2)(g - 4)$ <b>b)</b> $(7c + 2)(c + 4)$
<b>3a)</b> $3\sqrt{5}$ <b>b)</b> $2\sqrt{2}$	<b>21a)</b> $(x + 6)^2 + 4$ <b>b)</b> $(x - 5)^2 - 15$ <b>c)</b> $(x - 4)^2 - 18$
<b>4)</b> $4\sqrt{5}$	<b>22a)</b> $\frac{5r}{3p^2}$ <b>b)</b> $\frac{x+6}{x+2}$ <b>c)</b> $\frac{x}{x+6}$
<b>5)</b> $\frac{15}{\sqrt{5}} = \frac{15\sqrt{5}}{\sqrt{5}\sqrt{5}} = \frac{15\sqrt{3}}{5} = 3\sqrt{3}$	<b>23a)</b> $\frac{10 + 7cd}{5c}$ <b>b)</b> $\frac{2f^2 + 2f + 11}{(f+2)(f-3)}$
<b>6a)</b> $h^9$ <b>b)</b> $h^5$ <b>c)</b> $h^{-7}$ <b>d)</b> $h^{\frac{7}{2}}$	<b>24a)</b> $\frac{4fg-15}{5g}$ <b>b)</b> $\frac{-3x^2 + 5x - 6}{(x+1)(x+3)}$
<b>7a)</b> $v^5$ <b>b)</b> $w^2$ <b>c)</b> $x^9$ <b>d)</b> $y^{\frac{3}{2}}$	<b>25a)</b> $\frac{3}{4c^2}$ <b>b)</b> $\frac{2a^2 - a - 6}{3a + 15}$
<b>8a)</b> $f^6$ <b>b)</b> $g^{-12}$ <b>c)</b> $h^4$	<b>26a)</b> $\frac{a^4}{2c^2}$ <b>b)</b> $\frac{x^2 - 6x + 8}{x^2 - 1}$
<b>9a)</b> $b^{11}$ <b>b)</b> $c^7$ <b>c)</b> $d^{-2}$	<b>27a)</b> $5575\text{cm}^3$ <b>b)</b> $33.5\text{cm}^3$ <b>c)</b> $190.9\text{cm}^3$
<b>10a)</b> $\frac{1}{a^5}$ <b>b)</b> $\frac{3}{d^7}$ <b>c)</b> $\frac{1}{5d^4}$ <b>d)</b> $\frac{2}{5d^5}$	<b>28a)</b> $154\text{cm}^3$ <b>b)</b> $946\text{cm}^3$
<b>11a)</b> $\sqrt{a}$ <b>b)</b> $\sqrt[3]{a}$ <b>c)</b> $\frac{1}{\sqrt[4]{a}}$ <b>d)</b> $\sqrt[3]{a^{-2}}$	<b>29a)</b> $22.5\text{cm}^3$ <b>b)</b> $240.3\text{cm}^3$
<b>12a)</b> $\frac{1}{25}$ <b>b)</b> 8 <b>c)</b> 216 <b>d)</b> $\frac{1}{2}$	<b>30a)</b> $524\text{cm}^3$ <b>b)</b> $420\text{cm}^3$
<b>13a)</b> 1 <b>b)</b> 1 <b>c)</b> k <b>d)</b> 17	<b>31a)</b> $72.6\text{cm}^2$ <b>b)</b> $174\text{cm}^2$
<b>14a)</b> $x^2 + 11x + 24$ <b>b)</b> $x^2 - 11x + 24$ <b>c)</b> $x^2 - 5x - 24$	<b>32a)</b> 10.0cm <b>b)</b> 5.4cm
<b>15a)</b> $x^2 + 6x + 9$ <b>b)</b> $x^2 - 6x + 9$ <b>c)</b> $x^2 - 9$	<b>33a)</b> 4 <b>b)</b> -2 <b>c)</b> $\frac{5}{6}$ <b>d)</b> $-\frac{6}{7}$
<b>16a)</b> $15a^2 + 11a + 2$ <b>b)</b> $10b^2 - 23b + 12$	<b>34a)</b> 17.4% <b>b)</b> 13.3%
<b>17a)</b> $k^3 + 12k^2 + 38k + 21$ <b>b)</b> $6f^3 - f^2 - 49f + 24$	<b>35a)</b> 4.3m <b>b)</b> £97 800
<b>18a)</b> $(x + 3)(x + 8)$ <b>b)</b> $(x - 6)(x - 4)$ <b>c)</b> $(x + 8)(x - 6)$	<b>36a)</b> 24.5m <b>b)</b> 2 700

**37)** Mean = 74

**38)** Standard deviation = 9.1

**39)** On average group there are more passengers on Company A's buses because the mean is higher.

(OR: On average there are fewer passengers on Company B's buses because the mean is lower.)

There is more variation in the number of passengers on Company B's buses because the standard deviation is higher.

(OR: There is less variation in the number of passengers on Company A's buses because the standard deviation is lower).