Year 8 Maths – Number

Level 1 Questions	Level 2 Questions	Level 3 Questions	Challenge Questions
These question types represent the minimum requirements of the course. They are easier questions, normally with only one rule being applied at any time, they are mostly single step questions. These question types represent the minimum passing level for the course, a C level.	These questions represent a level of understanding above the minimum and often require more than one rule to be applied in a multi-step approach. The starting point or the approach to the question is not as clear. These question types represent a level of understanding at about the B level.	These questions represent of understanding well above what is required. They are questions with multiple steps and often with a range of different skills and thought processes embedded. The starting point is generally not given and may not even be clear as is the approach. These question types represent a level of understanding at about the A level.	Challenge questions appear at the end of the booklet. These questions can be very difficult and often require a range of different skills and thinking. They are questions where you need to think "out of the box" Other than knowing the questions are based on the current terms work you are given no indication of where to start or how to approach it.

Order of Operations (any 6 questions)

Level 1	Level 2	Level 3
Calculate the answer for the following questions leaving your final answer as a single whole number or fully reduced fraction.	Calculate the answer for the following questions leaving your final answer as a single whole number or fully reduced fraction.	Calculate the answer for the following questions leaving your final answer as a single whole number or fully reduced fraction.

Level 1

a) $5 \times 7 - 9$

b) $3 \times (8 - 1)$

c) $(2 + 5)^2$

d) $5 - 3^2$

e) $3 \times 6 + 7 \times 2$

f) $\frac{7+5}{4 \times 6}$

Level 2

a) $6 \times 9 - 5^2 \div 3$

b) $\left(\frac{15}{5}\right)^3 + \frac{4 \times 8 + 10}{2^3 - 1}$

c) $(7 + 1)^3 \div (4 \times 3)$

d) $7 \times 4 - 10 \div 2 + 5$

e) $\frac{5+3^2}{6+6 \div 2} \times \frac{(5+7)^2}{2^3 \times 6^2}$

f) $\frac{(5^3 - 5^2) \times 2}{6 + 5 \times 4 - 10}$

Level 3

a) $\frac{(7 - 3 \times 4)^2}{\left(8 + \frac{6}{2}\right) + 1} + \frac{(3+5)(6-8)}{5^3 \div 25 + 1}$

b) $\frac{6 \times (2+1)^2}{2^3 \times (9-5)} \div \left(\frac{2 \times 3 - 1}{2 \times (3-1)}\right)^3$

Place brackets in the following to make them true.

c) $1 + 3 \times 6 - 2 = 16$

d) $1 + 3 \times 3^2 = 144$

e) $1 + 3 \div 6 - 2 = \frac{7}{4}$

f) $4 + 5 \div 4 \div 3^2 = \frac{9}{16}$

Index Laws (any 6 questions)

Level 1	Level 2	Level 3
Simplify the following as much as possible leaving your answer in index form.	Simplify the following as much as possible leaving your answer in index form.	Simplify the following as much as possible leaving your answer in index form.

Level 1

a) $5^3 \times 5^6$

b) $(7^4)^8$

c) $(4^2 9^5)^3$

d) 3^0

e) $3^2 \times 3^5 \times 3^4$

f) $\frac{7^8}{7^5}$

Level 2

a) $(3^7 5^2 \times 3^6 5^9)^2$

b) $(2^3 \times 2^0)^4$

c) $\left(\frac{3^8 \times 4^{11} \times 5^2}{3^6 \times 4^2 \times 4^4}\right)^2$

d) $\frac{\left(\frac{3^{18}}{3^{10}}\right)}{\left(\frac{3^6}{3^3}\right)}$

e) $(7 \times 7^6)^2 \times 7^5$

f) $\left(\frac{3^7}{3^2}\right)^2 \times \left(\frac{3^3}{3^1}\right)^4$

Level 3

a) $\frac{\left(\left(\frac{8^8}{8^6}\right)^2 \times \left(\frac{3^8}{3^6}\right)^2\right)^3}{\left(\left(\frac{3^4}{8^2}\right)^5 \times \left(\frac{3^7}{8^2}\right)^3\right)^2}$

b) $\left(\frac{5^3 \times 4^2 \times 5^9}{5^{12} \times 4^3 \times 4^5}\right)^3 \div \left(\frac{\left(5^2 \times 4^3\right)^2 \times 4^3}{5^2 \times 5^3 \times 4^3}\right)^4$

c) $\frac{(3^8 \times 27^3)^2}{9^{12}} \times 81$

Prime Factorisation (any 6 questions)

Level 1	Level 2	Level 3
Find the prime factorisation of the following numbers leaving your answer in index form.	Find the prime factorisation of the following numbers leaving your answer in index form.	Use prime factorisation to determine the square root and/or cube root only if they are whole numbers.
a) 20 d) 128	a) 3042 b) 7546	a) 324 c) 46656
b) 125 e) 240	Use the given prime factorisation to determine the square root and/or cube root only if they are whole numbers.	b) 3375 d) 474552
c) 90 f) 126		e) 9216
	c) $441 = 7^2 \times 3^2$ e) $1728 = 2^3 \times 6^3$	f) Find the prime factorisation of 360 and use this to determine the 24 factors of 360.
	d) $64 = 2^6$ f) $11664 = 2^4 \times 3^6$	

Percentages (any 6 Questions)

Level 1	Level 2	Level 3
Calculate	Calculate	a) In a lottery for a charity they were giving away two cars as separate prizes, only 0.002% of tickets won prizes. How many tickets were sold?
a) 30% of 380	a) 63.5% if 124% is $620	
b) 65% of 750	b) 105% if 22 ½ % is $38.70	b) Mark works a 40 hour week and earns $575. His weekly earnings are increased by 15% and his number of hours worked is decreased by 5%. Calculate his new hourly pay rate.
c) What percentage is 38 of 40	c) The percentage of 560 that gives the same answer as 75% of 316	
d) What percentage is 0.4 of 3.2		
e) 80% if 20% is $25	d) If 30% of the price of a car is $5400 then what is the full price?	c) Each fortnight Rachel puts 38% of her pay toward her home loan and 12% of the remaining money toward her car loan. If she has $735 left after this how much does she earn each fortnight?
f) 5% if 40% is $120		

Percentages Continued

Level 1	Level 2	Level 3

Calculate the new price if
 	
g) $50 is raised by 20%
 	
h) $85 is decreased by 35%
 	
i) Peter makes a 28% loss on his $5000 investment
 	
j) Julie gets a pay increase of 3.6% on her wage of $78500 per year.
 	
k) You look at a TV that is 15% off. If the price of the TV is $2499 then how much would you save?
 	
l) If 15 of a total of 35 students in a class are female, what percentage of the class are male?
 	
m) A shop has a discount sale that marks down all prices by 20%. If a customer buys a jacket originally marked at $90, how much does he pay?
 	
n) A book store has a sale that gives customers $5 off any book in the store. If you buy a book that is normally $35 what percentage of the original price do you pay?
	e) Sarah scored 50% on a test. She was told she need 3 extra marks to score a passing grade of 55% on the test. What was the total mark the test was out of.
	
	f) A couple buy a $42250 car on a 5 year loan that charges 7.5% of the purchase price as interest. What would the monthly repayment for this couple be?
	
	g) A park contains 3800 m^2 of garden beds that makes up 12% of the total area. If the lawns make up 80%. How much lawn is there (in m^2)?
	
	h) In a class of 40 students 45% are male and one fifth of those have green eyes. How many male students do not have green eyes?
	
	i) Tracy spent 30% of her savings on a computer and 10% of the remaining savings buying software. What percentage of her savings did she have left?
	
	j) Blake has some money that he puts into a term deposit. The account earns 6 ¼ % interest over the term of the investment. Blake is told that at the end he will have $238500, how much was invested?
		d) In local council elections in a town of 20000 only 65% of people voted, and of those who voted 73% voted for the winning candidate, the new mayor. What percentage of the whole population of the town voted for the new mayor.
		
		e) A bag of mixed M&M's contains, by number, 20% peanut, 45% normal and 35% crispy. The distribution of colours is 24% blue, 20% orange, 16% green,14% yellow, 13% red, 13% brown.
		  i. What percentage of the average packet are red crispy M&M's
		  ii. How big would a a packet need to be in order to have exactly 50 Yellow peanut M&M's
		
		f) 40% of a group of students are going to a football match, and 23% of the students going to the football are also going to dinner afterwards.
		  i. What percentage of students go to both the football and the dinner afterwards?
		  ii. What is the minimum number that could be in the original group of students given that the percentages above are exact, not approximates.
		
		g) The length of a rectangle is increased by 10% and the width decreased by 5%.
		  i. If the area of the original rectangle is 50 cm^2, find the area of the new rectangle.
		  ii. Change only one of the above percentages so that the resulting area remains 50 cm^2

Ratio (any 6 questions)

Level 1	Level 2	Level 3
a) Divide $12 in a ratio of 1:3. b) Divide $40 in a ratio of 2:3. c) Divide $72 in a ratio of 5:4. d) Divide $36 in a ratio of 2:9. e) Divide $24 in a ratio of 1:2. f) Simplify the ratio 24:60 to its simplest form g) Simplify the ratio 360:132 to its simplest form h) If 65 is the larger part of the ratio 5:2 find the smaller part. i) If 18 is the smaller part of the ratio 6:13 find the larger part. j) 154 cm of wood is cut in the ratio 6:5 what are the lengths of wood? k) Two pieces of pipe are 60 cm and 160 cm long what is the simplest ratio of the smallest to the largest? l) Chocolate bars are either milk or dark, if the ratio of milk to dark is 8:3 and there are 24 dark chocolates, how many milk ones are there?	a) If the sum of the smaller and larger parts of the ratio 7:3:15 is 462 find the size of the middle sized part. b) A sum of money is divided in the ratio 2:5:7. If the smallest sum of money is $68 find the other two sums of money. c) At the local high school students have the choice of playing basketball, badminton or no sport at all. The ratio of those who play badminton to basketball to no sport is 5:8:2. If the school consists of 870 students how many of them play one of the two sports? d) A lottery win of $120000 is split in the ratio of 3:5 what is the difference between the money that each receives? e) In a local tennis club that has 80 members the ratio of male to female members is 3:7 if 20 more male members join the club what would be the new ratio? f) A quadrilateral has angles split in the ratio 2:2:3:5. How many right angles does it contain?	a) In a group of students the ratio of male to female students is 3:4. In the same group of students the ratio of brown hair to blonde hair to black hair is 5:6:4. What is the minimum number of students who could be in the group? b) At a local football function consisting of 153 people the ratio of Crows to Power supporters is 5:4. As it is a function sponsored by the Crows they would like the ratio to be 2:1. How many extra Crows supporters do they need to find? c) In a class of 57 there is a ratio of girls to boys of 4:15. How many boys have to leave the room to make the ratio of girls to boys 4:11? d) The ratio of the amount of water in bottle A to the amount of water in bottle B is 4:7. If 1/4 of the water in A is poured into B and then 1/4 of the water in B is poured into A, what will the new ratio be? e) Boxes A and B each contained some books. After 1/10 of the books in Box B was taken out and put into Box A, the ratio of the number of books in Box A to the number of books in Box B was 4:3. What was the ratio of the number of books in Box A to the number of books in Box B at first?

Challenge Questions

a) A teacher multiplied the ages of all of the students (all teenagers) in her class and came up with the number 15 231 236 267 520.

    i. What is the prime factorisation of this number?

    ii. Use the prime factorisation to help you work out the number of students in the class, their ages and the number of students of each age.

b) The product of two whole numbers is equal to 10 000, if neither of the two numbers are a multiple of 10 what are the two numbers?
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c) The square root and cube root of a number are both whole numbers. Give three possibilities for the initial number.

d) A disease has infected a town after 1 week a quarter of the town population have been hospitalised with the disease. At the end of the second week 20% of the hospitalised patients had got better and gone home, but 30% of those who were not hospitalised are now in hospital. What percentage of the town is in hospital with the disease at the end of the second week.

e) A 1.2L jug of cordial is 15% cordial with the rest being water. If the concentration of cordial needs to be dropped to 12% what volume of water should be added to the jug?

f) At Bathurst the ratio of those who like Holden to Ford to Nissan to Mercedes is 6:5:1:2, if 2000 extra supporters for each team show up the ratio is then 20:17:5:8. What is the original number of people at Bathurst before the extras arrived.

g) Last year the ratio of the number of boys to the number of girls in the computer club was 1:2. This year 70 new members joined the club and there are now 4 times as many boys and 3 times as many girls as last year. How many members were in the club last year?