Jeddah Knowledge International School

MATHEMATICS

SUMMER PACK
GRADE 8 to 9
2020 – 2021

Name: _____

Section: _____

Section A	Knowing and Understanding: Percentages

1) Write the percentage multipliers for the following as percentage:

a. amount
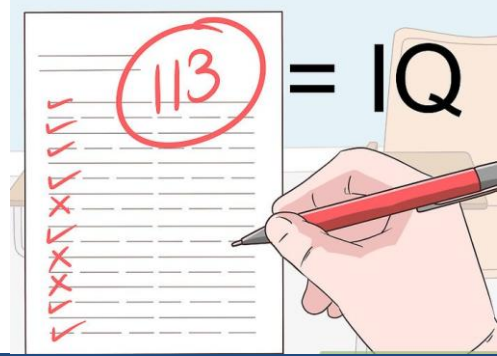
b. increase

c. reductions

i. 30%

ii. 2%

iii. 0.3%

2) A young fungus has a height of 10 cm. It grows by 3% every 30 days. What shall be its height after 120 days?

3) A shop sells butter normally at $3.50. It offers a 15% discount. What is the sale price?

4) 600 pupils took an IQ test. 80% achieved a score of 100 or more. 25% of these scores were higher than 115. How many pupils achieved a score greater than 115?

5) An oil tanks contains 18 liters of oil. Due to leakage, 2000 milliliters of oil is lost. What percent of oil is lost?

6) A house was bought for £230,000 in January 2018.
It had increased in value by 3% by January 2019 and had gone up by a further 11% by January 2020.
By what overall percentage did the value of the house increase between January 2018 and January 2020?

7) The value of car decreases by 22% and then a further 8%. What is the overall percentage reduction?

8) Imran purchased some stocks.

a) He made a profit of 6%. The new value of his stock is £657.20. How much did he invest?

b) If he makes 6% profit every year for the next 5 years, what will be the value of his total investment?

9) After a decrease of 22%, James salary was $1100. What was his original salary?

10) The table below shows the age distribution of people living in France:

Age	Number of people (millions)	Percentage
0-14	13.2	
15-64	32.3	
65 and older	9.9	
Total population	65.4	100%

Calculate the percentage of the population in each age group. Give each percentage to the nearest whole number. Fill in your answers in the last column of the table.

11) In a survey, 42.5% of people said they liked strawberry jam. If 800 people were surveyed, how many of them liked strawberry jam?

12) The value of a car depreciates 17% per year for four consecutive years. If the initial value was £8000, what is the value now? Write your answer to 2 significant figures.

13) A firm's profits were 12% higher last year than the year before last. This year it is expecting a loss of 1.5%. What is the overall percentage change over the two years?

14) Mariam has the option to select any three items from below.

If she receives a 10% discount on her total cost, which three items should she purchase to have the maximum saving in pounds?

£1.20 bananas	£3.50 flowers	£2.80 coffee	£1.90 sandwich
20p tomato	70p juice	90p bread	£2.10 bacon
£3.20 eggs	£4.30 chicken	£1.80 cereal	£1.30 jam

15) Calculate the following for a value of $450

   a) 10% increase

   b) 22% decrease

   c) 0.5 % increase

   d) 2% p.a compound interest per year for 3 years

16) Sarah is on a diet. She currently weighs 82.5kg and intends to lose 0.5% of her weight every day. Will she meet her target of 70 kg within 25 days? Justify your answer.

Section B	Investigating: Percentages

1) $500 is invested in a savings account with no money taken out at any time. Investigate how long it would take to increase by 25% with different simple interest rates. Do you notice a pattern?

	2) The length of a square is increase by 5%. How much will its area increase?

Index Laws

Simplify using index law:

a) $y^2 \times y^5 \div y^{-7} =$

b) $a^{2\frac{1}{2}} \cdot a^{1\frac{2}{3}} =$

c) $\left(3y^2\right)^3 =$

d) $2y^{-3}$

e) $\left(h^2\right)^3 \left(h^4\right)^{-2} =$

f) $\dfrac{c^2 \cdot c^5}{c^4} \times (2c)^2$

Expansion Laws

Remove the brackets and simplify if possible:

a) $\left(\dfrac{2x}{3y}\right)^2 =$

b) $(3xy)^2 =$

The Zero Index Laws

Simplify:

a) $7^0 =$

b) $\left(4^3\right)^0 =$

c) $\dfrac{5^a}{5^a} =$

d) $3 \times 3^2 - 3^0 =$

The Negative Index Laws

Simplify, giving answers in simplist rational form:

a) $7^0 - 7^{-1} =$

b) $\left(2^2\right)^3 - 2^0 + 2^{-1} =$

c) $\dfrac{1}{(9)\cdot(3^x)} =$

d) $\left(2t^{-1}\right)^4 =$

The Distributive Law

Expand and Simplify:

a) $-xy\left(2x - y^5\right) =$

b) $3a - 5\left(a^2 - 3b\right) =$

c) $5 - 3\left(b - \frac{2}{3}a\right) =$

d) $x^2 - x(x - 1) =$

e) $5(x - 2) - 3(x + 5) =$

f) $y^2(1 - y) - y(y^2 + 1) =$

Expand and Simplify:

a) $(2x + 1)(2x - 1) =$

b) $(5 - 7x^3)(2x^2 - 1) =$

c) $-3(2x - 3)^2 =$

d) $3(x^2 - 1)^2 =$

Section B	Investigating: Chapter 7

1- Complete the following:

1) $\left(a^2\right)^3 = a^2 \cdot a^2 \cdot a^2 = a^{2+2+2} = a$

2) $\left(a^3\right)^4 = a^3 \cdot a^3 \cdot a^3 \cdot a^3 = a^{3+3+3+3} = a$

3) $\left(a^n\right)^4 = a^n \cdot a^n \cdot a^n \cdot a^n = a^{n+n+n+n} = a$

What do you notice?

Can you find out the general rule of: $\left(a^n\right)^m = a$

Real Life Applications: Chapter 7

1) Find the algebraic expression of the area of a rectangle of length $l = (2x - 1)$ and width $w = (x - 3)$. Expand the result.

2) Find the expression of the speed of a car if the distance covered is $2x^5$ and the time is $8x^2$, where $x > 0$.

19A. Common Factors

Find the HCF of:

a) $10, 30$, and 8

b) $2x$ and $5x$

c) $3axy$ and $2ax$

d) $12x^2, 9x$ and $3xy$

e) $u^2(t+1)$ and $2t(t+1)^2$

f) $12x^2y^3z$ and $20xy^2$

19B. Factorising with common factor

Fully Factorise:

a) $2x - 2 =$

b) $ab - a =$

c) $18x - 12y =$

d) $x^2y + xy^2 =$

e) $a^2 - ab =$

f) $x^2(x+1) - x(x+1) =$

Section B   **Investigating: Chapter 19**

1) $a^2 - 16 = (\quad - \quad)(\quad + \quad)$

Use the result above to find an efficient way to calculate: $57^2 - 43^2 =$

8F. Solving Equations

Solve the following equations:

a) $3x + 1 = -3$	b) $-3x - 2 = 5$
c) $\frac{x}{2} = -30$	d) $\frac{5x}{3} - 6 = 1$
e) $\frac{3x}{2} - 5 = -7$	f) $\frac{4-2x}{3} = -5$
g) $3 - \frac{x-1}{4} = 5$	h) $\frac{5-2x}{3} - 3 = \frac{2}{5}$
i) $2(x - 1) + 4x = -x$	j) $3x - 2(2 - 5x) = 6$

Solve The Following Equations:

a) $3x - 1 + 5x = -2$

b) $-3x - 1 = -2(x + 3)$

c) $3(x - 1) + 5x = 13 - (x + 4)$

d) $\frac{x}{3} - 2x = 5$

e) $\frac{3x-1}{2} = \frac{5x-3}{5}$

f) $\frac{2x}{3} + \frac{x}{6} = 5$

Section B	**Investigating: Equations**

Task 1:
Did you know 5x = 10 has the same solution as 10x = 20?

Can you write five more equations that have the same solution as these two?

Task 2:
Can you write five equations that have a solution of -0.5?

Can you write them with a variety of operations?

Can you write them with the unknown on both sides?

Can you include fractions in one of your equations?

Applications: Equations

1) Translate into equations:

    a) I think of a number, double it. Then add 4. The result is 100.

    b) When a number is halved and 9 is added to the result, the result is 5 more than twice the number.

    c) The length of a rectangle is 10m longer than its width. The perimeter of the shape is 100m.

Section A — Knowing and Understanding: Inequalities

1) Write an inequality for the shown number lines
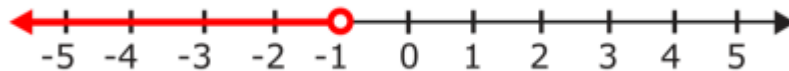
2) Draw the stated inequality

$x < -3$
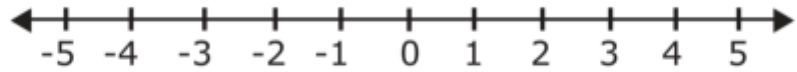
$x > -5$
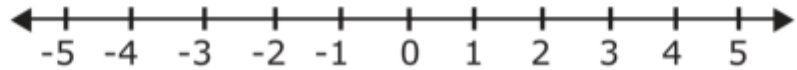
3) Solve and then draw the stated inequality

$4x + 1 < 9$
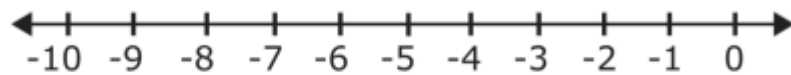
$2x - 1 > 5$
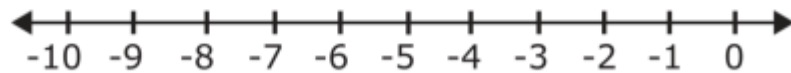
Section A	Knowing and Understanding: Probability

1) A spinner has 7 equal sections. Three are blue and four are red. What is the probability of landing on a red section?

2) The probability that it rains tomorrow is 0.3. What is the probability that it shall not rain?

3) Salman, Ahmed and John play a game. The probability that Salman wins is 30%. The probability that John wins is 25%. What is the probability that either Salman or Ahmed win?

4) Two fair 6-sided dice are rolled. What is the probability of their total being a multiple of 3?

5) The table below shows the probability of different coloured balls being chosen from a bag, randomly.

Colour	Grey	Green	Blue	Black
Probability	0.3	0.25		0.15

a) What is the probability of choosing a grey or green ball?

Amy realises that there are 15 grey balls.

b) How many balls are there together?

6) A gym has 1800 members.
2/3 of the members are male.
The probability that a male chosen is under 30 years of age is 2/5.
The probability that a female chosen at random is under 30 years of age is ¾.
How many members are under the age of 30?

7) The ages of people passing their driving test over a week were recorded below:

	Male	Female
17-21	24	20
21-25	12	9
25+	8	5

One person is to win a free car! What is the probability of:

a) choosing a male?
b) choosing a female aged between 21-25?
c) choosing a male 21 or over?

1) Alex has five plain jeans and 3 denim jeans. He has five striped tops and four plain tops. He decides to wear one of these jeans and tops at random. Fill in the tree diagram below:
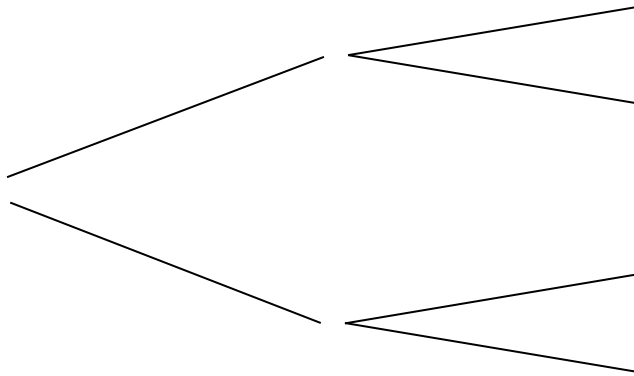
What is the probability that he wears at least one piece of plain clothing?

2) The probability that it rains on a day is 0.15 and independent of previous days. Fill in the tree diagram to show the possibilities of weather over two days.
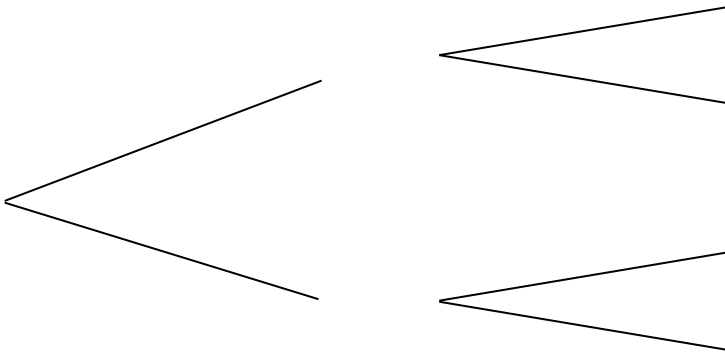
What is the probability that it shall not rain for two consecutive days?

1) Calculate x in each diagram.
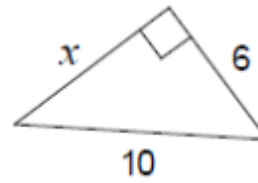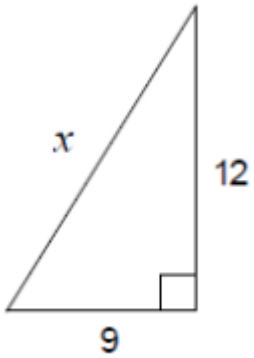
2) Should each triangle below have a right angle? Justify your answer.

a)

3 cm
4 cm
5 cm

b)

6.4 m
5.6 m
2.5 m

c)

9.6 km
12.8 km
16.0 km
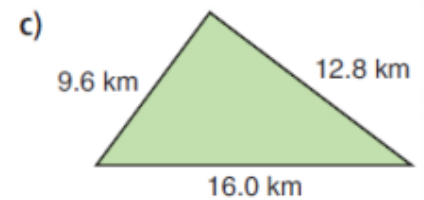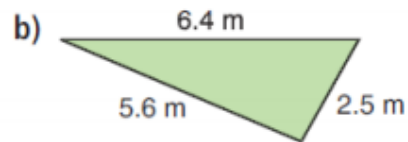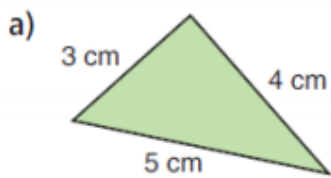
3) A 7m ladder is placed against a wall. The foot of the ladder is 1.5m from the foot of the wall. How far up the wall does the ladder reach?

4) What is the length of the diagonal of the rectangle below?

40 yards
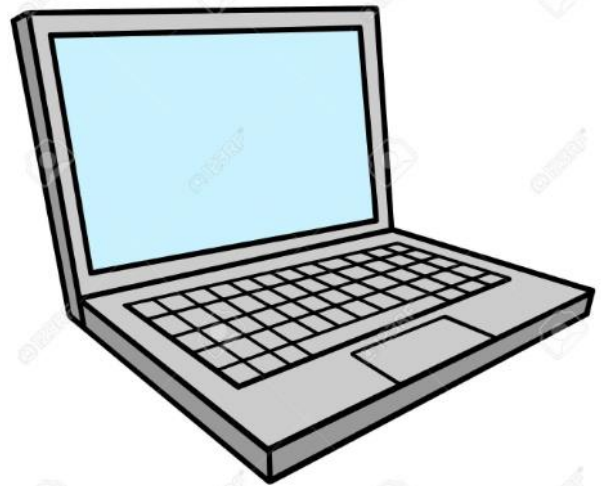
30 yards
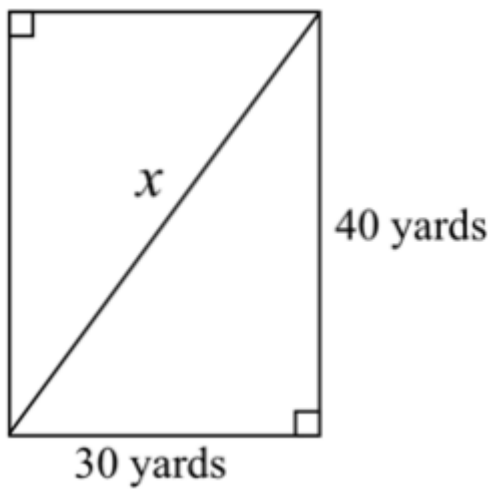
5) What is the area of the triangle?

b

13 cm

a   d   c
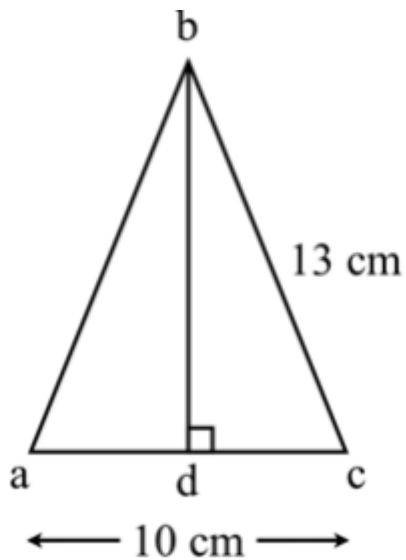
⟵ 10 cm ⟶

1) Mark is on his way home from work. He drives 45 miles due North. He then drives 40 miles due west. Find the shortest distance to his home from work.

2) Yusuf won a laptop in a school raffle. The laptop screen measures 12 in in height and 26 in in width. Find the diagonal length of the laptop screen.

Knowing and Understanding: Averages

1) Calculate the i) range, ii) mode iii) median and iv) mean for the following frequency table:

Number of Goals	Frequency
0	3
1	5
2	8
3	7

2) Calculate the i) range, ii) mode iii) median and iv) mean for the following set of data:

6.3, 4.9, 3.2, 4.9, 10.7, 2.1

Section B	Investigating: Averages

1) A set of 10 numbers has a median of 8.   A second set of 10 numbers has a median of 5. Is it possible to find the median of the combined set of 20 numbers? Explain.

2) A set of 5 numbers has a mean of 12.
A second set of 8 numbers has a mean of 9.
A third set of 18 numbers has a mean of 4.
Can you find the mean of the combined set of 31 numbers?

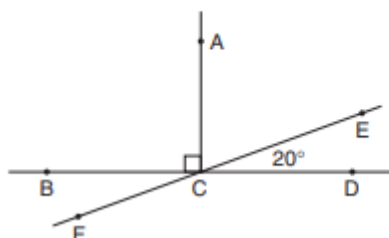| Section A	Knowing and Understanding: Angle Properties

1) Find x
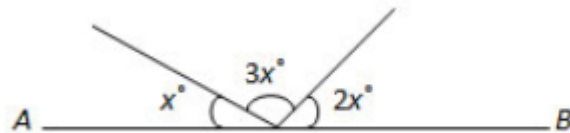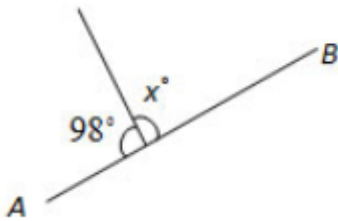
2)

Find the measure of each angle. Justify your answers.

a) $\angle ACE$ **b)** $\angle BCE$ **c)** $\angle FCD$

3)

Find the measures of ∠R and ∠P in △PQR.
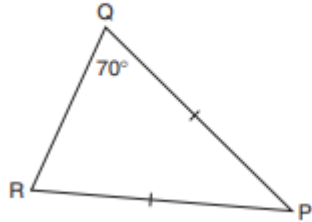
4) Find the missing angles
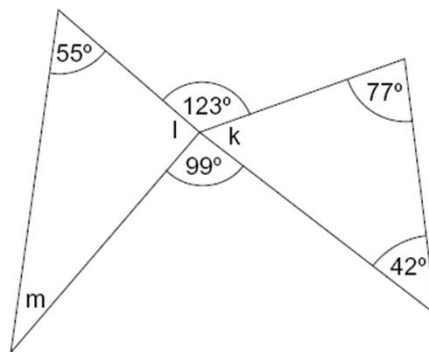
5)

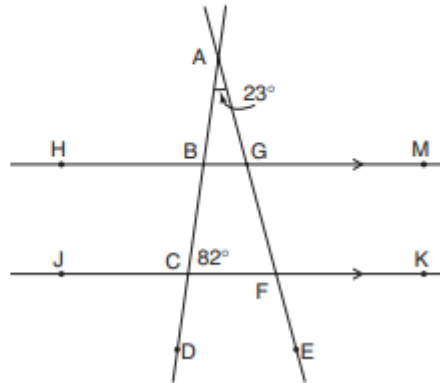Two transversals intersect parallel lines.
Find the measure of each angle.
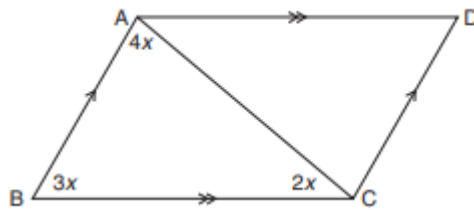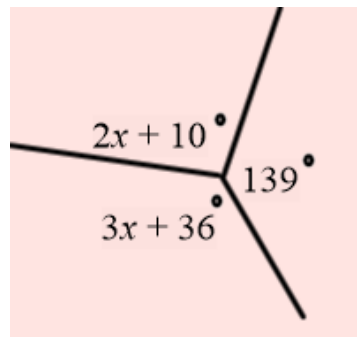Justify each answer.

a) $\angle HBC$

b) $\angle AFC$

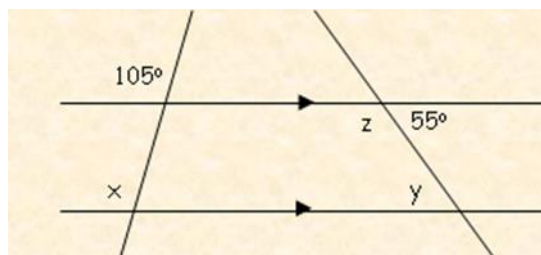**c)** $\angle AGB$

d) $\angle BGF$

6) Find the value of x

7) Solve for x

8) Solve for x

$3x - 20°$

$2x + 10°$
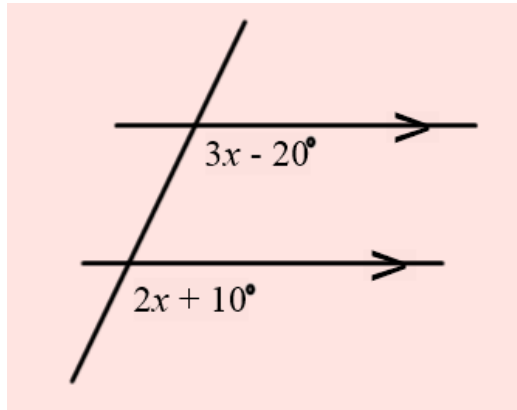
9) Find the unknown angles

$105°$

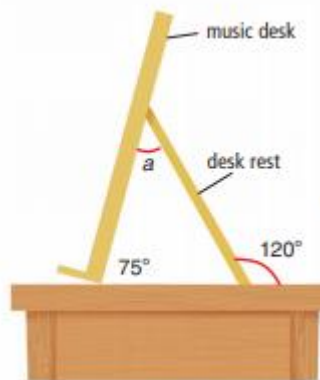z $55°$

x y

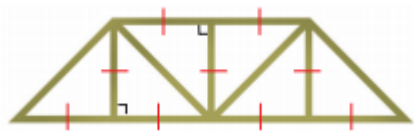| Section B	Investigating	

1) The music desk of a grand piano is supported by a desk rest. The side view of the music desk, desk rest, and top of the piano is a triangle.
   Use the given angles to find the angle a. Explain your answer

2) A truss is a framework for supporting a bridge.
   There are different types of trusses.
   The Pratt Truss uses right isosceles triangles.
   Design your own truss using triangles.
   Measure each angle.
   Find the sum of angles in different sections.
   What do you notice?

END OF SUMMER PACK