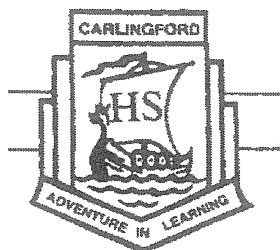


Carlingford High School



Year 9 Mathematics 5.3

2019 Term 4 Examination

Name: _____

Circle your teacher's name: Mrs Wilson/Young Miss Aung Mrs Lego Mr Wilson

Time allowed: 50 minutes

- Board approved calculators may be used.
- Show all necessary working.
- Marks may be deducted for careless or untidy work.
- Complete the examination in blue or black pen.

Topic	Equations	Indices	Geometry	Total
Mark	/19	/24	/25	/68

(Mrs Wilson/Mooney)

Equations (19 marks)

1. Solve for x

a) $3x + 7 = 5$

$$3x = -2$$

$$x = -\frac{2}{3}$$

b) $3y - 5 = -14 - 2y$

$$5y - 5 = -14$$

$$5y = -9$$

$$y = -\frac{9}{5}$$

c) $3(x + 2) - 7 = 11$

$$3x + 6 = 18$$

$$3x = 12$$

$$x = 4$$

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

$$2x - 2 = 1 - 3 + x$$

$$x = 0$$

2. a) Write an equation and find the number.

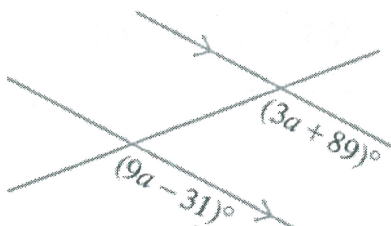
Seven more than a number is three more than twice the number.

$$x + 7 = 2x + 3$$

$$4 = x$$

$$x = 4$$

b) Form an equation and solve to find the value of the pronumeral.



$$3a + 89 = 9a - 31$$

$$120 = 6a$$

$$a = 20$$

3. Solve the following

a) $\frac{x-2}{5} + 8 = 11$

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

$$x-2 = 15$$

$$x = 17$$

b) $\frac{5x+2}{6} = \frac{7x-4}{5}$

$$5(5x+2) = 6(7x-4)$$

$$25x + 10 = 42x - 24$$

$$34 = 17x$$

$$x = 2$$

c) $\frac{x-7}{4} - \frac{x-1}{9} = 1$

$$9(x-7) - 4(x-1) = 36$$

$$9x - 63 - 4x + 4 = 36$$

$$5x - 59 = 36$$

$$5x = 95$$

$$x = 19$$

Miss Aung

Indices (24 marks)

4. Simplify fully

a) $a^6 \times a^9$

a^{15}

1

b) $2x^3 \times 4x^2$

$8x^5$

1

c) $\frac{y^{11}}{y^5}$

y^6

1

d) $20a^3b^2 \div 10ab$

$2a^2b$

2

e) $(2x^3)^2$

$4x^6$

2

f) $6x^0$

6

1

g) $(4a^3)^0 - 6a^0$

$1 - 6 = -5$

2

h) Simplify each expression, using a positive index.

3

i) $\left(\frac{4}{5}\right)^{-1}$

$\frac{5}{4}$

ii) $\left(\frac{3}{2x}\right)^{-2}$

$\frac{4x^2}{9}$

i) Write using a negative index

$\frac{4}{y^3}$

$4y^{-3}$

1

j) Write using a radical (root) sign

$(2x)^{\frac{1}{3}}$

$\sqrt[3]{2x}$

1

k) Write using a fractional index

$\sqrt[4]{123}$

$(123)^{\frac{1}{4}}$

1

l) Simplify fully

2

$\left(\frac{125}{x^3}\right)^{-\frac{2}{3}}$

$\left(\frac{x^3}{125}\right)^{\frac{2}{3}}$

$= \left(\frac{x}{5}\right)^2 = \frac{x^2}{25}$

1

m) Express 293.2 in scientific notation

2.932×10^2

n) Express 4.2×10^{-4} in decimal form

0.00042

1

o) If the average distance from the Earth to the Sun is $1.4951 \times 10^8 \text{ km}$ and light travels at $3 \times 10^5 \text{ km/s}$, how long does it take for light to travel from the Sun to the Earth in minutes? (answer to 3 decimal places)

2

8.30666...

8.307 minutes

p) Evaluate the expression in scientific notation, correct to three significant figures.

2

$\sqrt[4]{(5.2999 \times 10^{-2})^{10}}$

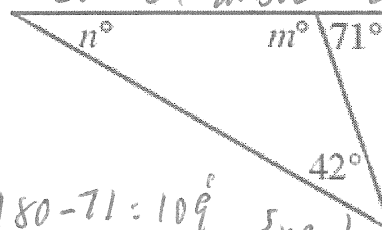
6.47×10^{-4}

5. Geometry (marks 25)

a) Find the value of all pronumerals, **giving reasons.** for 1 mark each

2

correct answer and correct reason.



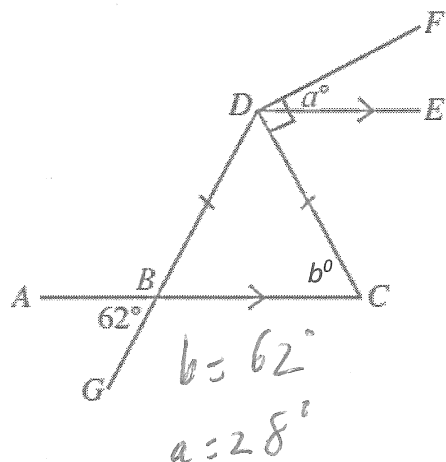
$m = 180 - 71 = 109^\circ$ supplementary angles

$n = 71 - 42$

$= 29^\circ$ exterior angle of a triangle is equal to sum of two interior opposite angles

b) Find the value of a and b (**without reasons**)

2



c) The sum of the interior angles of a regular polygon is 1980° .

i) How many sides has the polygon?

2

$1980 = 180(n-2)$

$11 = n - 2$

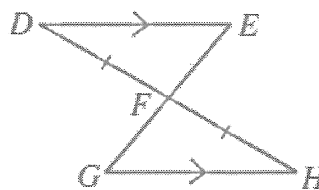
$n = 13$ sides

ii) Find the size of each exterior angle, to the nearest minute.

$\frac{360}{13} = 27^\circ 42'$

d) Prove that $\triangle DEF \equiv \triangle HGF$.

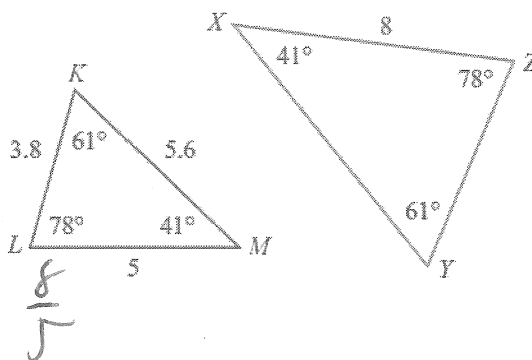
3



In $\triangle DEF$ & $\triangle HGF$
 $\angle FDE = \angle GHE$ (Alternate \angle 's)
 $\angle DEF = \angle FGH$ (as $DE \parallel GH$) (1)
 $DF = FH$ (given)
 $\therefore \triangle DEF \equiv \triangle HGF$ (a.s.) (1)

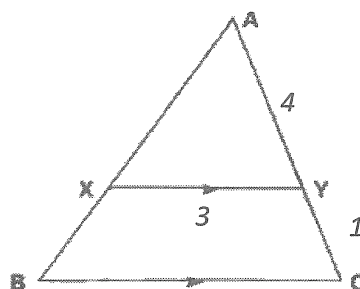
e) Find the enlargement factor for the similar triangles

1



f) i) $XY \parallel BC$, Prove that triangles AXY and ABC are similar.

2



a

In $\triangle AXY$ & $\triangle ABC$

1) $\angle XAY$ (common)

2) $\angle AXY = \angle ABC$ (corresponding angles as $XY \parallel BC$) (1)
 $\therefore \triangle AXY \parallel \triangle ABC$ (similarity angles equal) (1)

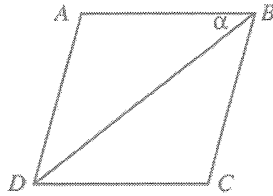
ii) Find the value of a .

2

$\frac{24}{5} = \frac{5}{4}$

$a = \frac{15}{4}$

g)



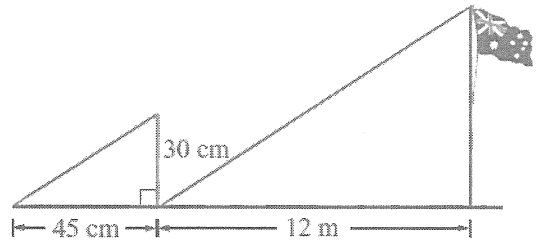
ABCD is a parallelogram. The diagonal BD bisects $\angle ADC$. Let $\angle ABD = \alpha$.

i) Prove that $AB = AD$.

In $\triangle ABD + \triangle BDC$
 $\angle DBA = \alpha$
 $\therefore \angle DCB = \alpha$ (Alternate angles = as $AB \parallel DC$)
 $\therefore \angle ADB = \alpha$ (as BD bisects $\angle ADC$ - given)
 $\therefore \triangle ADB$ is isosceles
 $AB = AD$

3

h) On a bright sunny day the shadow cast by a flagpole is 12 m long. At the same time the shadow cast by a 30 cm ruler is 45 cm long. Find the height of the flagpole.



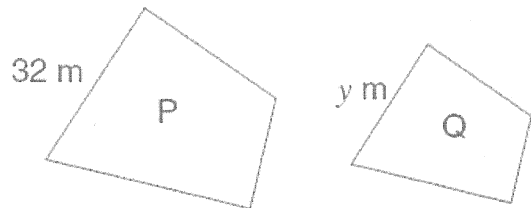
$$\frac{2L}{30} = \frac{12}{45}$$

$$x = \frac{12 \times 30}{45}$$

$$= 8 \text{ m}$$

i) Find the value of y if the two figures are similar.

2



Area P
 $= 592 \text{ m}^2$

Area Q
 $= 333 \text{ m}^2$

ii) Explain what special quadrilateral is ABCD.

1

Rhombus as opposite sides are parallel and all sides equal

$$\frac{y^2}{32^2} = \frac{333}{592}$$

$$y^2 = \frac{333 \times 32^2}{592}$$

$$y^2 = 576$$

$$y = 24 \text{ m}$$

End of exam