

# Carlingford High School



## Mathematics Year 9 5.2 Term 3 Test 2017

Student Name:

---

Circle your Teacher below.

Mrs. Tomar

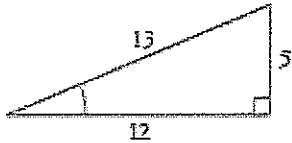
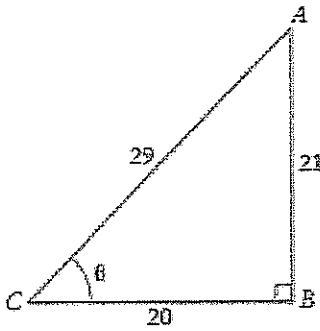
Mr Cheng

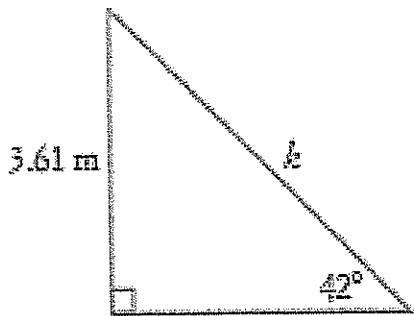
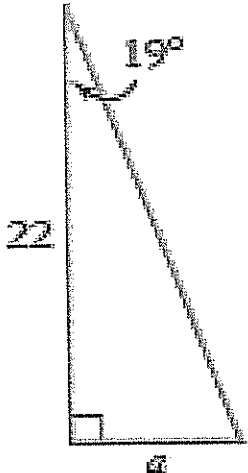
Mrs Pennington

*Time allowed: 55 minutes*

- Complete the examination in blue or black pen.
- Show all necessary working.
- Attempt all questions.
- Extension questions are marked with an asterisk \*.

	Trigonometry	Geometry	Algebra	Total	
Questions	/22	/23	/10	/	
Extension	/8	/6		/	
Total	/30	/29	/10	/69	%

	Trigonometry	Marks
1	<p>For the marked angle, write the length of the:</p>  <p>a adjacent side _____</p> <p>b hypotenuse _____</p> <p>c opposite side _____</p>	(3)
2	<p>If <math>\cos \phi = 0.5</math>, What is the value of <math>\phi</math>?</p>	(1)
3	<p>Round each angle to the nearest degree.</p> <p>(a) <math>64^{\circ}27'</math></p> <p>(b) <math>25^{\circ}43'</math></p>	(2)
4	<p>Write as a fraction:</p>  <p>a <math>\sin \theta</math> _____</p> <p>b <math>\cos \theta</math> _____</p>	(2)
5	<p>Round each angle to the nearest minute.</p> <p>(a) <math>50^{\circ}19'26''</math></p> <p>(b) <math>64^{\circ}18'30''</math></p>	(2)

6	<p>Convert the following:</p> <p>(a) <math>43.15^\circ</math> to degrees and minutes</p> <p>(b) <math>21.862^\circ</math> to degrees and minutes, to the nearest minute.</p>	(2)
7	<p>Evaluate each expression, correct to four decimal places.</p> <p>(a) <math>\tan 8^\circ 45'</math></p> <p>(b) <math>\frac{13}{\cos 18^\circ 27'}</math></p>	(2)
8	<p>Find each pronumeral, correct to two decimal places:</p> <div style="display: flex; justify-content: space-around; align-items: flex-start;"> <div>(a)</div> <div>(b)</div> </div> <div style="display: flex; justify-content: space-around; align-items: center;">   </div>	(4)

9	Find the size of angle A correct to the nearest minute.  (a) $\sin A = \frac{7}{9}$  (b) $\tan A = 15.07$	(4)
10 *	A wheelchair ramp is 6 m long and makes an angle of $4.5^\circ$ with the ground. How high is the top of the ramp above the ground (correct to two decimal places)	(3)
11 *	Sean is sitting in the cinema 21.2 m away from the screen. The angle from his seat to the top of the screen is $13^\circ 18'$ , measured from the horizontal.  (a) Draw a diagram to show this information          (b) Find the height of the top of the screen	(5)

- (c) Sean moves closer to the screen so that he is 11 m from the front. At what angle (correct to the nearest minute) is the top of the screen now?

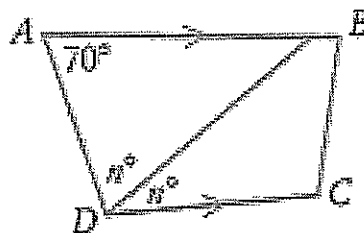
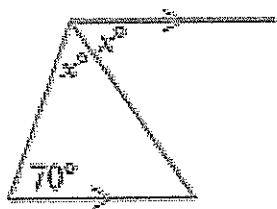
## Geometry

1

- (a) What is the angle sum of a pentagon? \_\_\_\_\_
- (b) The \_\_\_\_\_ angle of a triangle is equal to the \_\_\_\_\_ of the two interior \_\_\_\_\_ angles.
- (c) The angle sum of a polygon with  $n$  sides is given by the formula
- $A = \text{-----}$

(3)

- 2 What is the value of  $x$  and  $n$  in the diagrams?



(2)

3	<p>(a) Find the sum of the angle of this regular hexagon</p> <div> </div> <div> <p>_____</p> <p>_____</p> <p>_____</p> </div> <p>(b) Find the size of one angle in the regular hexagon.</p> <div> <p>_____</p> </div>	(3)
4	<p>Write one property of the:</p> <p>(a) sides of a parallelogram</p> <div> <p>_____</p> </div> <p>(b) Angles of a parallelogram</p> <div> <p>_____</p> </div> <p>(c) Diagonals of a parallelogram</p> <div> <p>_____</p> </div>	(3)
* 5	<p>Find the number of sides of a regular polygon if:</p> <p>(a) Each exterior angle is <math>12^\circ</math></p>	(1)

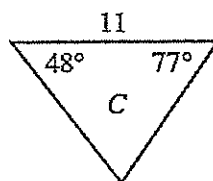
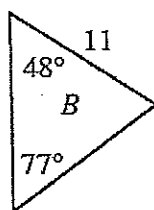
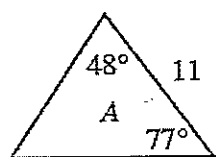
(b) Each interior angle is  $160^\circ$

(3)

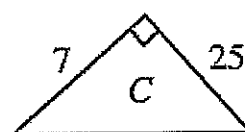
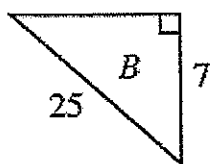
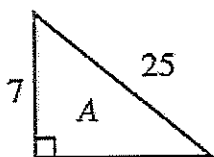
6 For the triangles below, name a pair of congruent triangles.

(2)

(a)



(b)



7 Which of the following is not a test for Congruent triangles? Circle the correct answer.

(1)

A. AAS

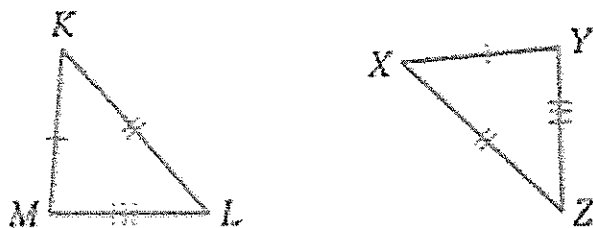
B. AAA

C. SAS

D. RHS

8

(3)



(a) Which congruence test proves that

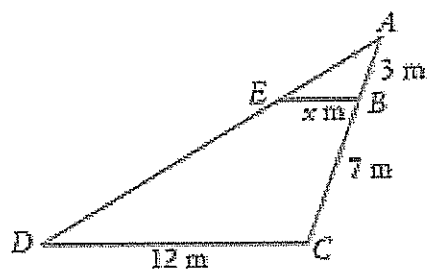
$\triangle KLM \equiv \triangle XYZ$ ? \_\_\_\_\_

(b) Which angle in  $\triangle XYZ$  matches with  $\angle L$ ? \_\_\_\_\_

(c) Which side in  $\triangle XYZ$  matches with  $LM$ ? \_\_\_\_\_

9  
\*

(1)



(a) In this diagram,  $EB \parallel DC$ . Why is it true that  $\angle ABE = \angle ACD$ ?

\_\_\_\_\_

(b) If  $\triangle ABE$  and  $\triangle ACD$  are similar then find  $x$ .

(2)

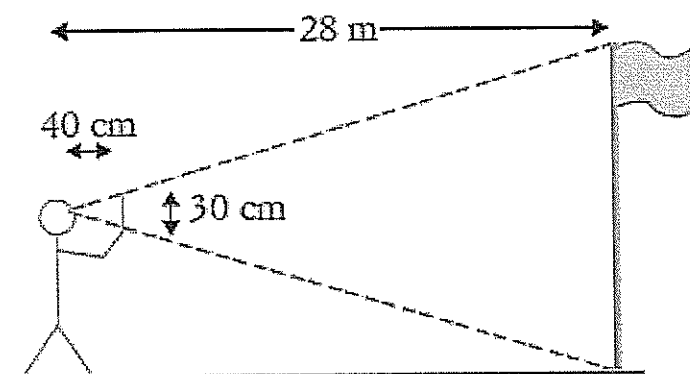


10 The scale on a tourist map of central Sydney is  $2\text{ cm} = 500\text{ m}$ . (2)

(a) Express the map's scale as a simplified ratios.

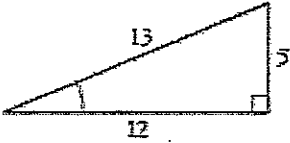
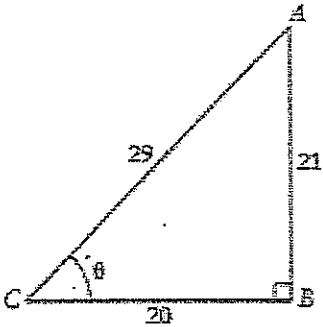
(b) If the scaled distance from Central station to the Powerhouse Museum is  $3.2\text{ cm}$ , what is the actual distance?

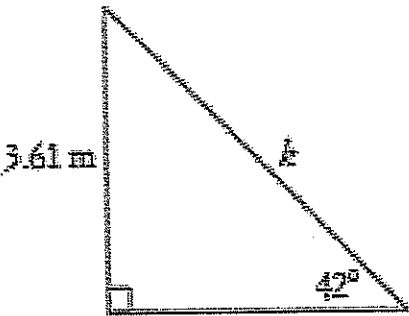
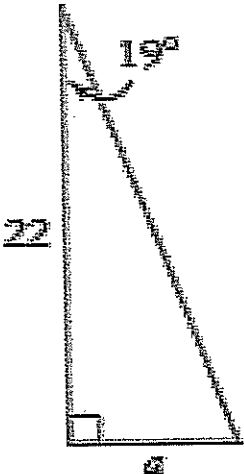
11 \* Emily holds up a small stick  $40\text{ cm}$  from her eye so that it appears to be the same height as the flagpole. She is standing  $28\text{ m}$  from the flagpole and the stick is  $30\text{ cm}$  long. Find the height of the flagpole. (3)

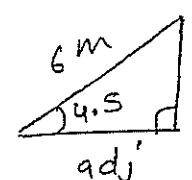
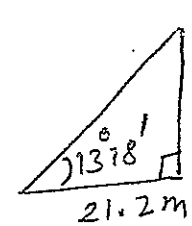


	Algebra	
1	<p>Expand and simplify each expression.</p> <p>(a) <math>(p + 4)(p - 8)</math></p> <p>_____</p> <p>_____</p> <p>_____</p> <p>(b) <math>(2y + 5)(y + 3)</math></p> <p>_____</p> <p>_____</p> <p>_____</p> <p>(c) <math>7(n - 3) + n(n - 1)</math></p> <p>_____</p> <p>_____</p> <p>_____</p> <p>_____</p>	(6)
2	<p>Copy and complete each factorisation.</p> <p>(a) <math>4a + 12 = \text{_____}(a + 3)</math></p> <p>(b) <math>6a^2b - 8ab = 2ab(\text{_____} - \text{_____})</math></p> <p>(c) <math>x(x - 2) + 5(x - 2) = (x - 2)(\text{_____})</math></p> <p>(d) <math>x^2 - 7x = \text{_____}(x - 7)</math></p>	(4)



	Trigonometry	Marks
1	<p>For the marked angle, write the length of the:</p>  <p>a adjacent side <u>12</u></p> <p>b hypotenuse <u>13</u></p> <p>c opposite side <u>5</u></p>	(3)
2	<p>If <math>\cos \phi = 0.5</math>, What is the value of <math>\phi</math>?</p> <p style="text-align: center;"><math>\phi = 60^\circ</math></p>	(1)
3	<p>Round each angle to the nearest degree.</p> <p>(a) <math>64^\circ 27'</math> <u><math>64^\circ</math></u></p> <p>(b) <math>25^\circ 43'</math> <u><math>26^\circ</math></u></p>	(2)
4	<p>Write as a fraction:</p>  <p>a <math>\sin \theta</math> <u><math>21/29</math></u></p> <p>b <math>\cos \theta</math> <u><math>20/29</math></u></p>	(2)
5	<p>Round each angle to the nearest minute.</p> <p>(a) <math>50^\circ 19' 26''</math> <u><math>50^\circ 19'</math></u></p> <p>(b) <math>64^\circ 18' 30''</math> <u><math>64^\circ 19'</math></u></p>	(2)

6	<p>Convert the following:</p> <p>(a) <math>43.15^\circ</math> to degrees and minutes <math>43^\circ 9'</math></p> <p>(b) <math>21.862^\circ</math> to degrees and minutes, to the nearest minute. <math>21^\circ 52'</math></p>	(2)
7	<p>Evaluate each expression, correct to four decimal places.</p> <p>(a) <math>\tan 8^\circ 45'</math> <math>0.1539</math></p> <p>(b) <math>\frac{13}{\cos 18^\circ 27'}</math> <math>13.7044</math></p>	(2)
8	<p>Find each pronumeral, correct to two decimal places:</p> <div style="display: flex; justify-content: space-around;"> <div style="width: 45%;"> <p>(a)</p>  <p><math>\sin \theta = \frac{O}{H}</math>  <math>\sin 42^\circ = \frac{3.61}{k}</math> ✓ ①  <math>k = \frac{3.61}{\sin 42^\circ}</math>  <math>k = 5.40</math> ✓ ①</p> </div> <div style="width: 45%;"> <p>(b)</p>  <p><math>\tan \theta = \frac{O}{A}</math>  <math>\tan 19^\circ = \frac{a}{22}</math> — ①  <math>a = 22 \times \tan 19^\circ</math>  <math>a = 7.58</math> — ①</p> </div> </div>	(4)

9	<p>Find the size of angle A correct to the nearest minute.</p> <p>(a) <math>\sin A = \frac{7}{9}</math> <math>A = \sin^{-1}\left(\frac{7}{9}\right)</math> — ①  <math>A = 51^{\circ}3'</math> — ①</p> <p>(b) <math>\tan A = 15.07</math> <math>A = \tan^{-1}(15.07)</math> — ①  <math>A = 86^{\circ}12'</math> — ①</p>	(4)
10 *	<p>A wheelchair ramp is 6 m long and makes an angle of <math>4.5^{\circ}</math> with the ground. How high is the top of the ramp above the ground (correct to two decimal places)</p> <div>  <p><math>\sin \theta = \frac{O}{H}</math></p> <p><math>\sin 4.5^{\circ} = \frac{x}{6}</math> — ①</p> <p><math>x = 6 \times \sin 4.5^{\circ}</math></p> <p><math>x = 0.47</math> — ①</p> </div>	(3)
11 *	<p>Sean is sitting in the cinema 21.2 m away from the screen. The angle from his seat to the top of the screen is <math>13^{\circ}18'</math>, measured from the horizontal.</p> <p>(a) Draw a diagram to show this information</p> <div>  <p>— ②</p> </div> <p>(b) Find the height of the top of the screen</p> <div> <p><math>\tan \theta = \frac{O}{A}</math></p> <p><math>\tan 13^{\circ}18' = \frac{h}{21.2}</math></p> <p><math>h = 21.2 \times \tan 13^{\circ}18'</math> — ①</p> <p><math>= 5.01 \text{ m}</math></p> </div>	(5)

- (c) Sean moves closer to the screen so that he is 11 m from the front. At what angle (correct to the nearest minute) is the top of the screen now?

$$\tan \theta = \frac{O}{A}$$

$$\tan \theta = \frac{5.01}{11} \quad \text{--- (1)}$$

$$\theta = \tan^{-1}\left(\frac{5.01}{11}\right) = 24^{\circ}29' \quad \text{--- (1)}$$

## Geometry

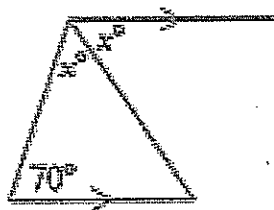
- (a) What is the angle sum of a pentagon?  $\frac{(n-2) \times 180^{\circ}}{1} = 540^{\circ}$  --- (1) (3)

- (b) The Exterior angle of a triangle is equal to the Sum of the two interior Opposite angles. --- (1)

- (c) The angle sum of a polygon with n sides is given by the formula

$$A = \frac{(n-2) \times 180^{\circ}}{1} \quad \text{--- (1)}$$

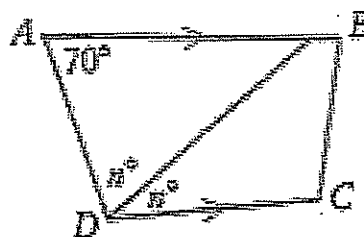
- 2 What is the value of x and n in the diagrams?



$$180^{\circ} = 70^{\circ} + 2x \quad \text{--- (1)}$$

$$2x = 110^{\circ}$$

$$x = 55^{\circ}$$



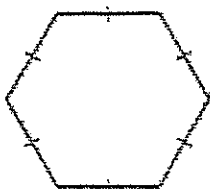
$$180^{\circ} = 2n + 70^{\circ}$$

$$2n = 110^{\circ}$$

$$n = 55^{\circ} \quad \text{--- (1)}$$

(a) Find the sum of the angle of this regular hexagon

(3)



$$(n-2) \times 180^\circ \quad \text{---} \quad \textcircled{1}$$

$$(6-2) \times 180^\circ$$

$$4 \times 180^\circ = 720^\circ \quad \text{---} \quad \textcircled{1}$$

(b) Find the size of one angle in the regular hexagon.

$$\frac{720^\circ}{6} = 120^\circ \quad \text{---} \quad \textcircled{1}$$

Write one property of the:

(3)

(a) sides of a parallelogram

Opposite sides are parallel

(b) Angles of a parallelogram

Opposite angles are equal

(c) Diagonals of a parallelogram

Bisect each other.

\* 5 Find the number of sides of a regular polygon if:

(1)

(a) Each exterior angle is  $12^\circ$

$$\frac{360^\circ}{12^\circ} = 30 \text{ sides}$$

---  $\textcircled{1}$

(b) Each interior angle is  $160^\circ$

$$\text{Exterior angle} = 180^\circ - 160^\circ = 20^\circ \quad \text{--- (1) (3)}$$

$$\text{Sum of ext-angles} = 360^\circ \quad \text{--- (1)}$$

$$\text{number of exterior angles} = 360^\circ \div 20^\circ = 18 \quad \text{--- (1)}$$

$\therefore$  Regular polygon has 18 sides

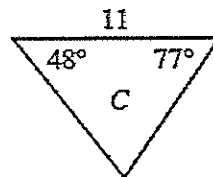
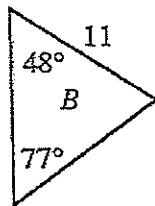
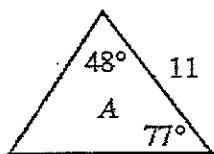
$$\frac{180(n-2)}{n} = 160^\circ \quad \text{--- (1)}$$

$$n \times 160^\circ = 180(n-2) \Rightarrow 160n = 180n - 360 \Rightarrow 180n - 160n = 360 \Rightarrow 20n = 360 \Rightarrow n = 18 \quad \text{--- (1)}$$

6

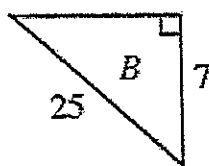
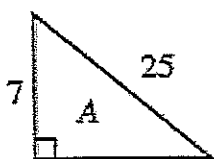
For the triangles below, name a pair of congruent triangles.

(a)



AC --- (1)

(b)



AB --- (1)

7

Which of the following is not a test for Congruent triangles? Circle the correct answer. (1)

A. AAS

☒ B. AAA

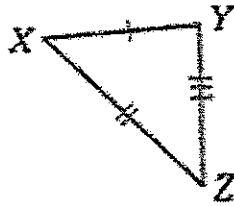
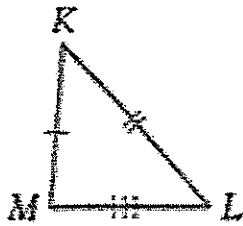
C. SAS

D. RHS



8

(3)



(a) Which congruence test proves that

$\triangle KLM \equiv \triangle XYZ$ ? SSS

— (1)

(b) Which angle in  $\triangle XYZ$  matches with  $\angle L$ ?  $\angle Z$

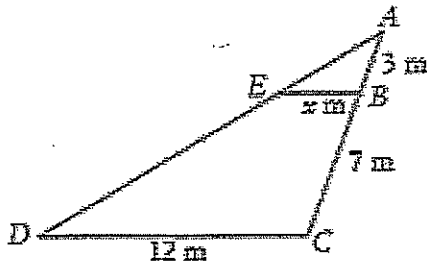
— (1)

(c) Which side in  $\triangle XYZ$  matches with  $LM$ ?  $YZ$

— (1)

9  
\*

(1)



(a) In this diagram,  $EB \parallel DC$ . Why is it true that  $\angle ABE = \angle ACD$ ?

corresponding angles on parallel lines

(b) If  $\triangle ABE$  and  $\triangle ACD$  are similar then find  $x$ .

(2)

$$\frac{x}{12} = \frac{3}{10}$$

— (1)

$$x \times 10 = 12 \times 3$$

$$10x = 36$$

$$x = \frac{36}{10} = 3.6$$

— (1)

10

The scale on a tourist map of central Sydney is  $2 \text{ cm} = 500 \text{ m}$ .

(2)

(a) Express the map's scale as a simplified ratios.

$$2 \text{ cm} = 500 \text{ m}$$

$$2 \text{ cm} = 50000 \text{ cm}$$

$$1 : 25000$$

①

(b) If the scaled distance from Central station to the Powerhouse Museum is  $3.2 \text{ cm}$ , what is the actual distance?

$$3.2 \times 25000 = 80,000 \text{ cm}$$

$$= 800 \text{ m} \quad \text{---} \quad \text{①}$$

11

\*

Emily holds up a small stick  $40 \text{ cm}$  from her eye so that it appears to be the same height as the flagpole. She is standing  $28 \text{ m}$  from the flagpole and the stick is  $30 \text{ cm}$  long. Find the height of the flagpole.

(3)

$$\triangle OAB \parallel \triangle OCD$$

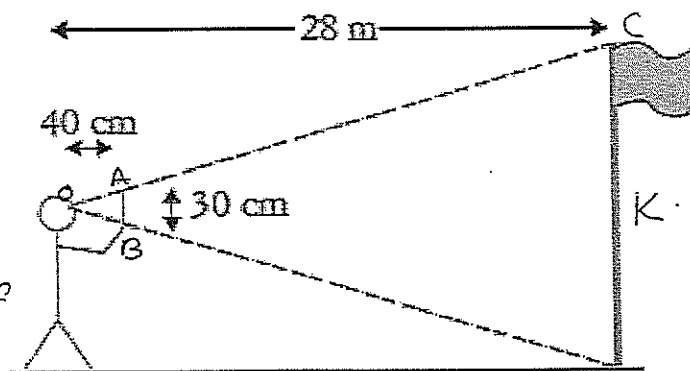
$$\frac{CD}{AB} = \frac{OC}{OA} \quad (\text{Ratios of matching sides in similar triangles are equal.})$$

$$\frac{K}{30} = \frac{2800}{40}$$

$$40 K = 30 \times 2800$$

$$K = \frac{30 \times 2800}{40} = 2100 \text{ cm}$$

$$\text{or } 21 \text{ m} \quad \text{---} \quad \text{①}$$



# Algebra

1 Expand and simplify each expression.

(6)

(a)  $(p+4)(p-8)$

$$p \times p - 8 \times p + 4 \times p - 8 \times 4 \quad \text{---} \textcircled{1}$$

$$p^2 - 8p + 4p - 32$$

$$p^2 - 4p - 32 \quad \text{---} \textcircled{1}$$

(b)  $(2y+5)(y+3)$

$$2y \times y + 2y \times 3 + 5 \times y + 5 \times 3$$

$$2y^2 + 6y + 5y + 15 \quad \text{---} \textcircled{1}$$

$$2y^2 + 11y + 15 \quad \text{---} \textcircled{1}$$

(c)  $7(n-3) + n(n-1)$

$$7n - 21 + n^2 - n \quad \text{---} \textcircled{1}$$

$$n^2 + 6n - 21 \quad \text{---} \textcircled{1}$$

\_\_\_\_\_  
\_\_\_\_\_  
\_\_\_\_\_

2 Copy and complete each factorisation.

(4)

(a)  $4a + 12 = \underline{4}(a + 3) \quad \text{---} \textcircled{1}$

(b)  $6a^2b - 8ab = 2ab(\underline{3a} - \underline{4}) \quad \text{---} \textcircled{1}$

(c)  $x(x-2) + 5(x-2) = (x-2)(\underline{x+5}) \quad \text{---} \textcircled{1}$

(d)  $x^2 - 7x = \underline{x}(x - 7) \quad \text{---} \textcircled{1}$

END OF EXAMINATION

