Year 9 Common - Term 4 2018

TIME : 65 minutes

Name:

Teacher:

Directions

- Full working should be shown in every question.
- Marks may be deducted for careless or badly arranged work.
- Use black or blue pen only (not pencils) to write your solutions.
- No liquid paper/correction tape is to be used.
  If a correction is to be made, one line is to be ruled through the incorrect answer.
- The diagrams are not to scale.
- Approved calculators are allowed

(For Teacher use only)

Marking Grid

	Algebra, Surds & Indices	Measurement and Trigonometry	Coordinate geometry and Quadratics	Geometry	Statistics and Probability and Financial	**Total**
Page 2	*1-4,7,8* /10				*5,6* /4	/14
Page 3	*9* /3		*11* /2		*10,12* /7	/12
Page 4			*14,15* /7		13 /5	/12
Page 5		*17,18* /7		*16* /4		/11
Page 6	*21* /3	*20,* /2	*19,22* /9			/14
Page 7			*24* /5	*23* /4		/9
Multiple Choice	*1,4,6* /3		*2,3,5* /3			/6
Total	/19	/9	/26	/8	/16	/78

Part A

Show your working and answers neatly in the space provided

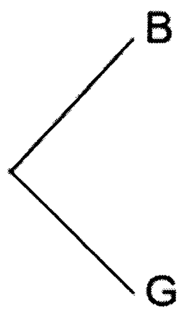
Q	Question	Marks
1	Simplify $\sqrt{75} - \sqrt{48}$	1
2	Rationalise the denominator and simplify your answer: $\dfrac{\sqrt{3}+1}{\sqrt{3}-1}$	2
3	Factorise fully:	
	(a) $9y^2 - 36$	1
	(b) $2t^2 - 7t + 6$	1
4	Expand and simplify: $(m^2 - 3n)^2$	1
5	After a 120% increase, the new value of an artwork is $264. By how much did the value increase?	2
6	A sum of $5000 is placed in a bank account and earns interest at 6% p.a. compounding monthly. How much money is in the account at the end of 6 years?	2
7	Find the discriminant and hence determine the number of solutions of the equation $2x^2 - 3x + 7 = 0$ (Do **not** solve the equation)	2
8	Solve $x^2 - 6x + 2 = 0$ by completing the square. Give the solutions in exact form.	2

9 Solve

(a) $5x^2 = 25x$ **1**

(b) $x^2 + 12x - 64 = 0$ **2**

10 (a) Complete the tree diagram to show all possible outcomes for a family of 3 children. (b=boy, G=girl) **1**



(b) What is the probability there are more boys than girls? **1**

(c) What is the probability that the eldest and youngest child are both girls? **1**

11 The three points $D(-1,3)$, $E(1,7)$ and $F(3k-4, 2k+3)$ are collinear. Find the value of k. **2**

12 At a sporting event, 50 people were observed to see whether or not they were wearing a hat.

(a) Complete the two-way table below **2**

	Hat	No hat	Total
Man	22		
Woman		3	
Total		9	50

(b) If a person is selected at random from the group, what is the probability that it is a woman wearing a hat? **1**

(c) If the person chosen is a man, what is the probability that he is wearing a hat? **1**

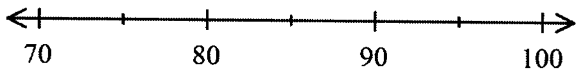
13 The diagram shows an ordered stem and leaf plot for a set of exam results

7	0 7 8
8	0 0 5 5 5 8 8 9
9	2 4 5 5

(a) Find the median. **1**

(b) Determine the interquartile range. **2**

(c) Display the data in a box plot. **2**



14 Find the equation of a parabola with x −intercepts 0 and -2, which also passes through the point (2,-12). **2**

15 For the parabola, $y = 2x^2 - 4x + 5$

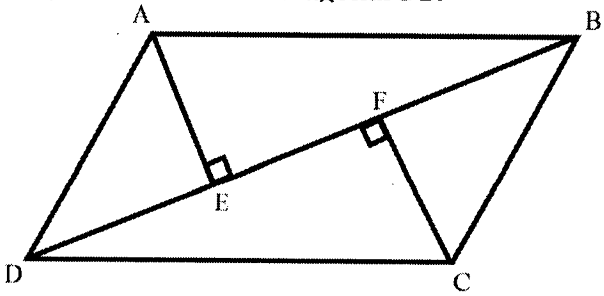
(a) Find the y −intercept. **1**

(b) Find the equation of the axis of symmetry. **1**

(c) Find the coordinates of the vertex. **1**

(d) Neatly sketch the parabola, showing its important features. **2**

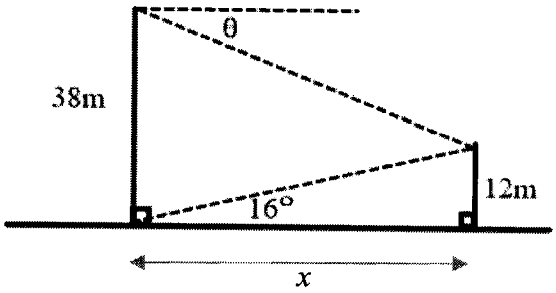
16 In the diagram below (not drawn to scale), ABCD is a parallelogram. AE and CF are drawn perpendicular to the diagonal DB.



(a) Prove $\Delta AEB \equiv \Delta CFD$. **3**

(b) Hence or otherwise, explain why AE=FC. **1**

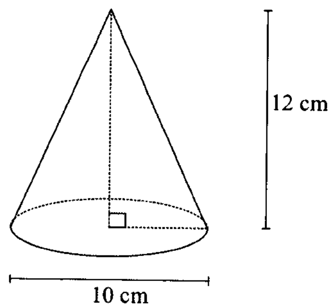
17 The angle of elevation of the top of a tree from the base of a building is 16°. The tree is 12m high and the building is 38m high.



(a) Find the distance, x metres, from the base of the tower to the base of the tree. Answer correct to 1 decimal place. **2**

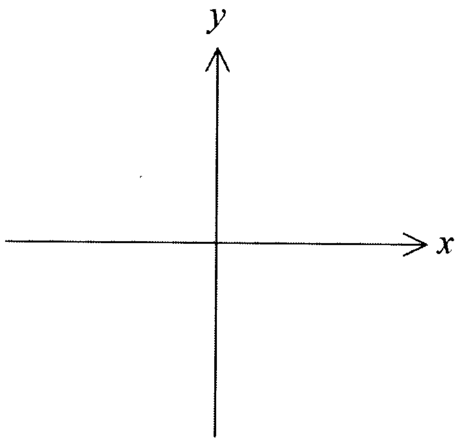
(b) Find the angle of depression, θ, of the top of the tree from the top of the building. Answer correct to the nearest degree. **2**

18 Find the exact surface area of the cone. **3**

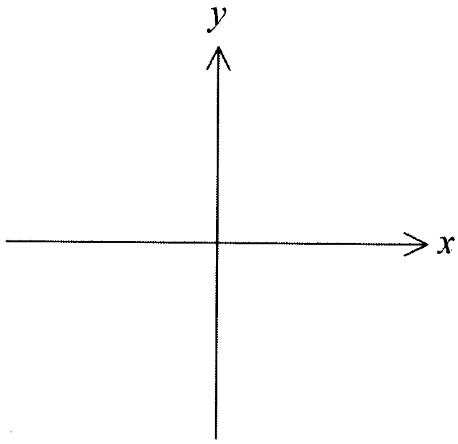


19 Sketch the following graphs, clearly showing any intercepts and asymptotes.

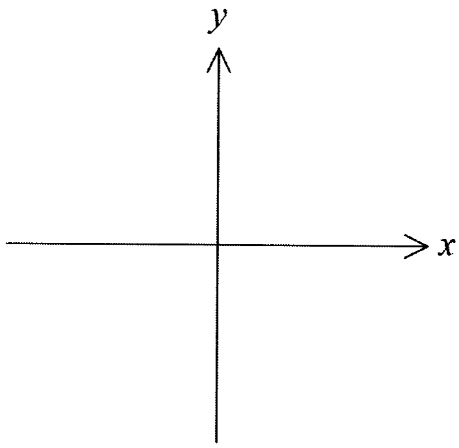
(a) $y = 3 + |2x|$ **2**



(b) $y = -\sqrt{9 - x^2}$ **2**



(c) $y = \frac{1}{x-1} + 2$ **3**

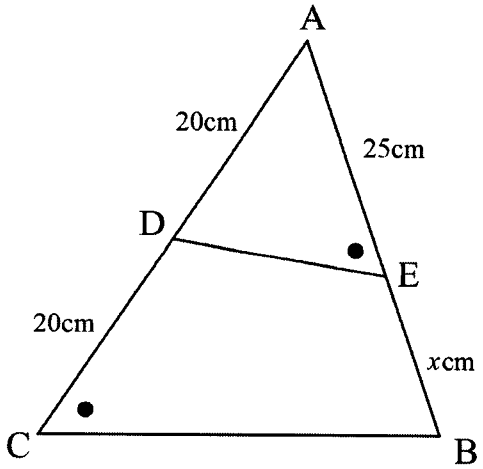
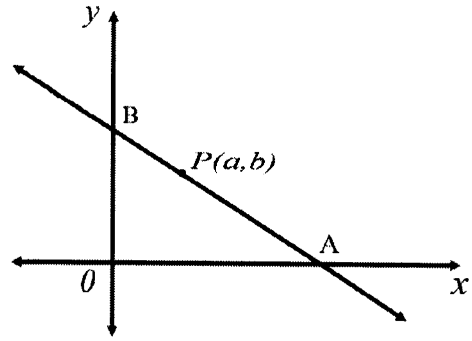


20 If $\sin\theta = \frac{2}{3}$ and θ is acute, find the exact value of $\cos\theta$. **2**

21 Express in simplest form **3**

$$\frac{x^2 + 8x^{-1}}{1 + 2x^{-1}}$$

22 Find the maximum value of $15 - 2x - x^2$. **2**

23	 Not to scale (a) Prove $\Delta ABC \vert\vert\vert \Delta ADE$. **2** (b) Hence find the value of x, giving reasons. **2**	24	The diagram below shows the points $A(6,0)$ and $B(0,4)$, and the point $P(a,b)$ which lies on AB.  (a) Find the gradient of AB. **1** (b) Show that the equation of AB is $2x + 3y - 12 = 0$. **2** (c) If the ratio of the area of ΔOPA to the area of ΔOPB is 3:1, find the coordinates of P. **2**

Part B
Multiple choice (1 mark each)
Circle the most appropriate answer.

1 The solutions of $2x^2 + 7x - 2 = 0$ are:

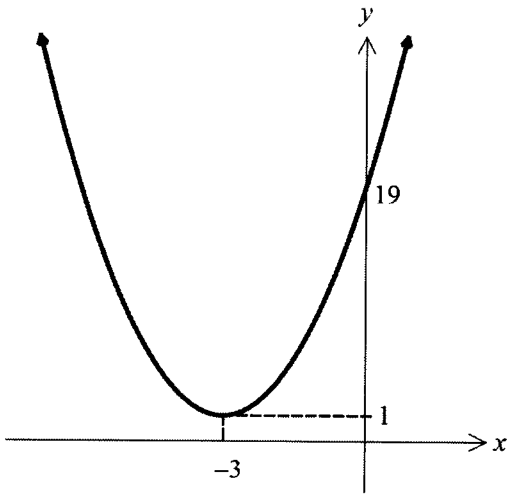
(A) $x = \frac{-7\pm\sqrt{33}}{2}$

(B) $x = \frac{-7\pm\sqrt{65}}{2}$

(C) $x = \frac{-7\pm\sqrt{33}}{4}$

(D) $x = \frac{-7\pm\sqrt{65}}{4}$

2 Which of the following is the equation of the parabola shown?



(A) $y = (x-3)^2 + 1$

(B) $y = (x+3)^2 + 1$

(C) $y = 2(x-3)^2 + 1$

(D) $y = 2(x+3)^2 + 1$

3 The centre and radius of the circle with equation $(x-4)^2 + (y+3)^2 = 5$ are respectively:

(A) $(4,-3)$, $r = 5$

(B) $(4,-3)$, $r = \sqrt{5}$

(C) $(-4,-3)$, $r = 5$

(D) $(-4,3)$, $r = \sqrt{5}$

4 If $f(x) = x^2 - 7x + k$ and $f(k) = -9$, then the value of $f(-1)$ is

(A) -9

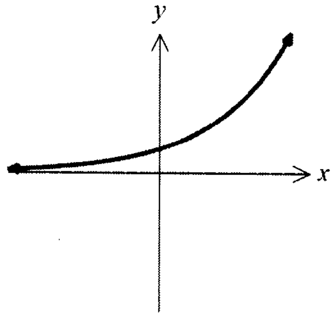
(B) -3

(C) 3

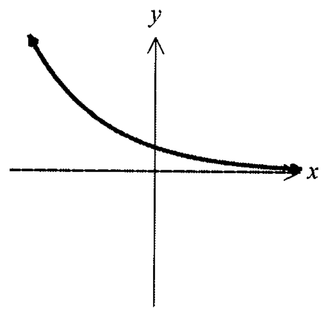
(D) 11

5 Which graph best represents $y = -3^{-x}$?

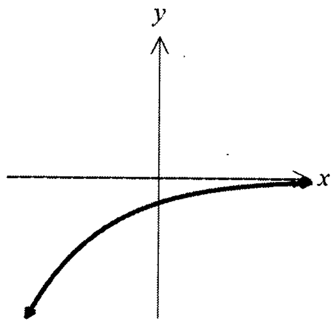
(A)



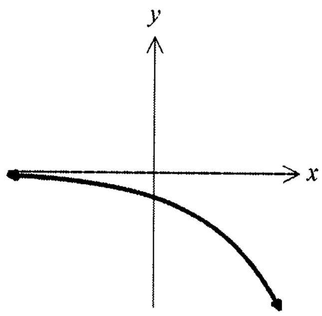
(B)



(C)



(D)



6 Given $2^{x+1} + 2^x = 3^{y+2} - 3^y$, where x and y are integers, the value of x is:

(A) 0

(B) 1

(C) 2

(D) 3

End of Exam ☺