Name: ____________________

Class:	Registration No. :
Secondary 3 / _____	_____________

CHIJ KATONG CONVENT
END-OF-YEAR EXAMINATION 2007
MATHEMATICS
Paper 1 ONLY

Classes: 3.3, 3.4, 3.5, 3.6

Time: 1 hour 30 minutes

Additional materials:
Electronic calculator

READ THESE INSTRUCTIONS FIRST

Write your name, class and registration number in the spaces at the top of this page and on all the work that you hand in. Write in dark blue or black pen. You may use a pencil for any diagrams or graphs. Do not use staples, paper clips, highlighters, glue or correction fluid.

Answer **all** questions.

If working is needed for any question, it must be shown in the spaces provided with the answer. Omission of essential working will result in loss of marks. Calculators should be used where appropriate.

You are expected to use an electronic calculator to evaluate explicit numerical expressions.
If the degree of accuracy is not specified in the question, and if the answer is not exact, give the answer to three significant figures. Give answers in degrees to one decimal place. For π, use either your calculator value or 3.142, unless the question requires the answer in terms of π.

At the end of the examination, fasten all your work securely together.
The number of marks is given in brackets [ ] at the end of each question or part question.
The total number of marks for this paper is 50.

Total Score: (Paper 1)	/ 50

This question paper consists of 11 printed pages (including this cover page).

[Turn over

Mathematical Formulae

Compound interest

$$\text{Total amount} = P\left(1+\frac{r}{100}\right)^n$$

Mensuration

$$\text{Curved surface area of a cone} = \pi rl$$

$$\text{Surface area of a sphere} = 4\pi r^2$$

$$\text{Volume of a cone} = \frac{1}{3}\pi r^2 h$$

$$\text{Volume of a sphere} = \frac{4}{3}\pi r^3$$

$$\text{Area of triangle ABC} = \frac{1}{2}ab\sin C$$

$$\text{Arc length} = r\theta\text{, where } \theta \text{ is in radians}$$

$$\text{Sector area} = \frac{1}{2}r^2\theta\text{, where } \theta \text{ is in radians}$$

Trigonometry

$$\frac{a}{\sin A} = \frac{b}{\sin B} = \frac{c}{\sin C}$$

$$a^2 = b^2 \mp c^2 - 2bc\cos A$$

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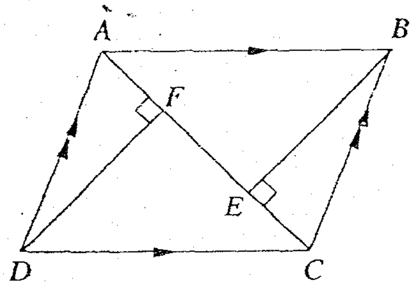
1 The value of a property increased by 44.3% between January and August 2007.
In January 2007 the property was valued at $485 000.
Find its value in August 2007.

Answer $ ______________________ [2]

2 Name two pairs of congruent triangles in the diagram and state the case of congruency.



Answer ________ ≡ ________ (________) [2]

________ ≡ ________ (________) [2]

3 Express
(a) 4.321 correct to 1 decimal place,
(b) 0.0519859 correct to 4 significant figures,
(c) 0.0067 in standard form.

Answer (a) ______________________ [1]

(b) ______________________ [1]

(c) ______________________ [1]

4 10 men take 8 days to build a 40 m bridge. After working for 2 days, 2 men came down with dengue fever. Find the number of days the remaining men need to work in order to complete the building of the bridge.

Answer ______________ days [3]

5 (a) If an exterior angle of an octagon is 66° while the other seven exterior angles are each equal to x°, calculate the value of x.

(b) Find the smallest interior angle of the octagon.

Answer (a) ______________ [2]

(b) ______________ ° [1]

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6 Express each of the following as a single fraction in its simplest form.

(a) $\dfrac{x+5}{x-y}+\dfrac{3}{y-x}$,

(b) $\dfrac{6}{4-9b^2}\div\dfrac{18}{3b+2}$.

Answer (a) ______________________________ [2]

(b) ______________________________ [2]

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7 Given that $M=\dfrac{x(2y+x)}{4y-1}$, express y in terms of x and M.

Answer ______________________________ [2]

8 (a) Simplify $2(x-6)-(x-5)(x-4)$.

(b) Factorise completely $3x - mx - 3y + my$.

(c) Solve the equation $(y-5)^2 = 36$.

Answer (a) ______________________________ [1]

(b) ______________________________ [1]

(c) $y =$ ____________ or ____________ [2]

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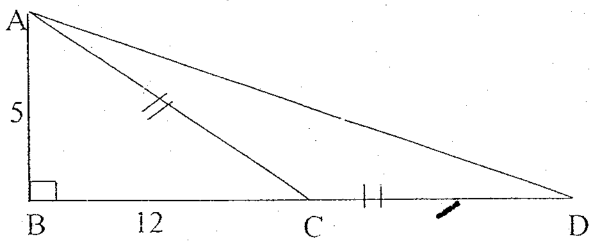
9 In the diagram, BCD is a straight line, BC = 12 cm, AB = 5 cm, $\angle ABC = 90^0$ and AC = CD.

Find

(a) $\cos\angle BAC$,

(b) $\tan\angle ACD$,

(c) the area of ΔACD.



Answer (a) $\cos\angle BAC =$ ____________________ [2]

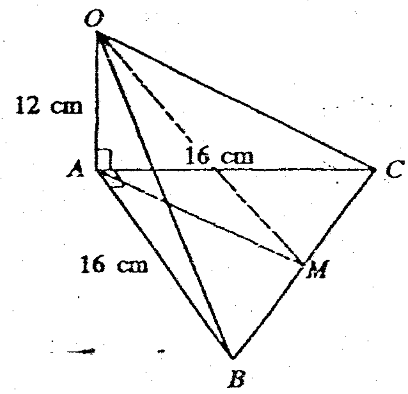
(b) $\tan\angle ACD =$ ____________________ [1]

(c) ____________________ cm^2 [2]

10 In the diagram, $OABC$ is a tetrahedron with ABC on the level ground and O is vertically above A. M is the mid-point of BC. Given that $\angle BAC = 90°$, $AB = AC = 16$ cm and $OA = 12$ cm, calculate the length of

(a) OB,

(b) OM.



Answer (a) OB = ______________ cm [1]

(b) OM = ______________ cm [3]

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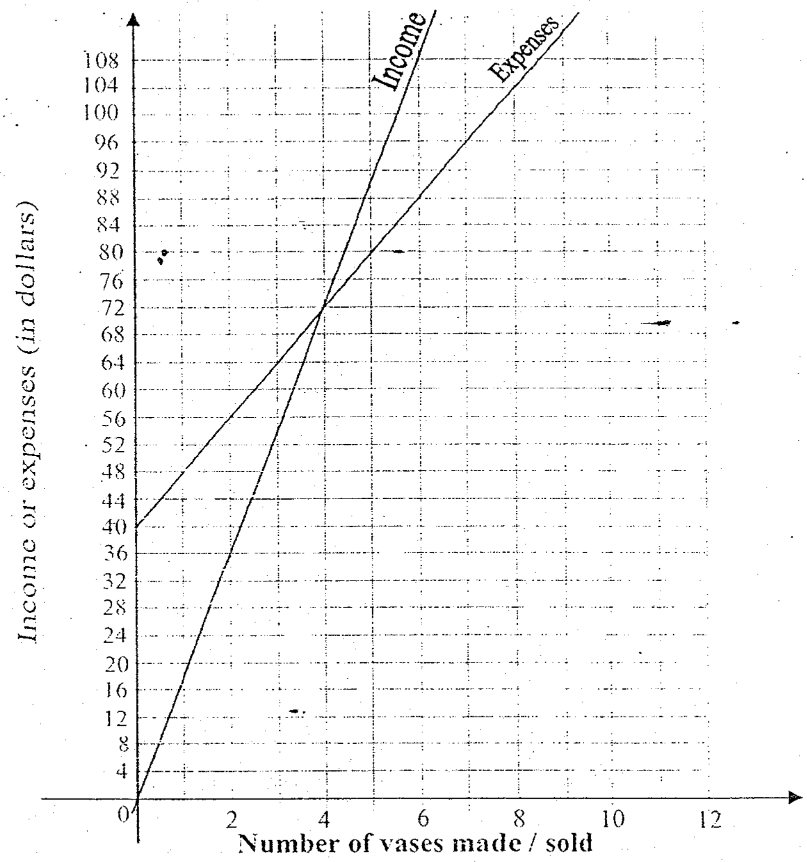
11 The graph below shows the number of vases made and sold by an artist each day. There is a fixed start-up cost and each vase is produced at a price of $8. Each completed vase is sold at $18.



(a) State the initial fixed start-up cost.

(b) How many vases must be made and sold to break even?

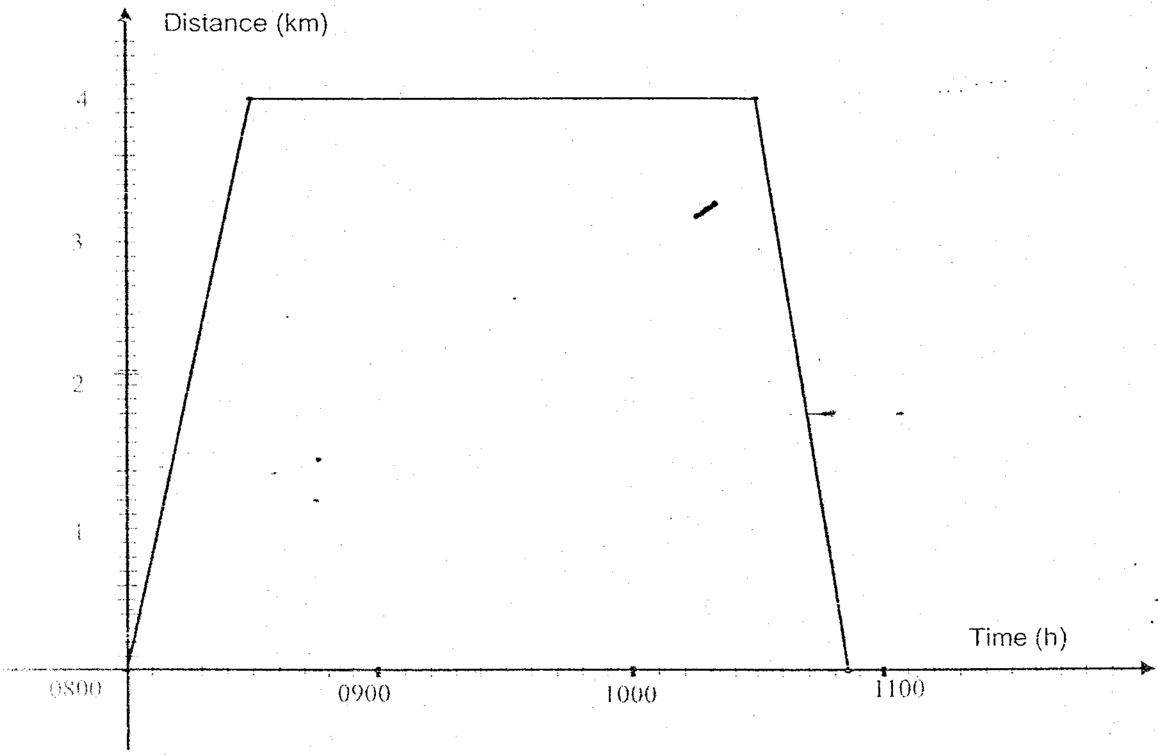
(c) How many vases must be sold to have a profit of $20?

Answer (a) $ ______________________ [1]

(b) ______________________ vases [1]

(c) ______________________ vases [1]

12 The travel graph below shows Alison's journey from home to school and back to home again on a Saturday. She started cycling from home on a bicycle at 0800 hours.



From the graph, find

(a) the speed at which Alison was cycling on her journey to school,

(b) the duration she stayed in school,

(c) the time at which she arrived home.

Answer (a) ______________________ km/h [2]

(b) ______________________ h [1]

(c) ______________________ [1]

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13 Figure A shows a skeleton tower with 6 layers.

The table below shows the number of cubes in each layer.

Layer (n)	No. of cubes in layer n	Total no. of cubes in the tower with n layers
1	1	1
2	5	6
3	9	15
4	13	28
5	17	45
6	p	q
:	:	:
:	:	:
k	x	y

(a) Study the pattern and write down the value of p and the value of q.

(b) Express, as simply as possible, in terms of k, an algebraic expression for x and for y.

(c) State the number of cubes in layer 15.

(d) Calculate the number of cubes needed to build a tower with 30 layers.

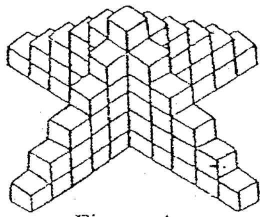

Figure A

Answer (a) p = __________ , q = __________ [2]

(b) x = __________ , y = __________ [4]

(c) ____________________ [1]

(d) ____________________ [2]

END OF PAPER 1

CHIJ Katong Convent - EM3 EOY P1 Answers

1. $\frac{144.3}{100} \times 485000 = \$699855$

2. Answers to this questions vary.
Depends on order of the 2 sets of congruent triangles in answer. Below is one possible answer.

$\Delta ADF \equiv \Delta CBE$ (AAS)
$\Delta ABE \equiv \Delta CDF$ (RHS or AAS)

3a. 4.3 3b. 0.05199 3c. 6.7×10^{-3}

4. 2 days, completed $\frac{2}{8} \times 40 = 10$ m

Rate of doing work = 40/80 = 0.5 m per man per day

8 men needed to completed remaining 30 m in $\frac{30}{8 \times 0.5} = 7.5$ days.

5a. $7x + 66 = 360$
$x = 42$

5b. $180 - 66 = 114°$

6a. $\frac{x+5-3}{x-y} = \frac{x+2}{x-y}$

6b. $\frac{6}{(2+3b)(2-3b)} \times \frac{3b+2}{18} = \frac{1}{3(2-3b)}$

7. $4My - M = 2xy + x^2$
$4My - 2xy = M + x^2$
$y = \frac{M + x^2}{4M - 2x}$

8a. $2x - 12 - x^2 + 9x - 20 = -x^2 + 11x - 32$

8b. $x(3-m) - y(3-m) = (3-m)(x-y)$

8c. $y - 5 = \pm 6$
$y = -1 \quad or \quad 11$

9a. $\cos \angle BAC = \frac{5}{13}$

9b. $\tan \angle ACD = -\tan \angle ACB = -\frac{5}{12}$

9c. $\frac{1}{2}(13)^2 \sin \angle ACD = \frac{169}{2} \times \frac{5}{13} = 32.5 \text{ cm}^2$

10a. $OB = \sqrt{12^2 + 16^2} = 20\text{cm}$

10b. $OM = \sqrt{OB^2 - BM^2} = \sqrt{400 - 128} = 16.5$ cm

11a. $40 11b. 4 11c. 6

12a. 8 km/h 12b. 2 h 12c. 10.51p.m.

13a. p = 21, q = 66

13b. x = 4k – 3, y = k (2k – 1)

13c. 4(15) – 3 = 57

13d. 30(60 – 1) = 1770