# Mathematics 1201 

Final Examination
June, 2018

## Suggested Solutions

Total Value: 70 marks

Time: 2 Hours

## GENERAL INSTRUCTIONS

1. Candidates are required to do all items.
2. The examination has a total of 18 pages (including this cover) consisting of the following parts:

| Part I: | 35 Selected Response Items | Value: |
| :--- | :--- | :--- |
| Part II: | 12 Constructed Response Questions | Value: |
| 35 marks |  |  |

3. Page $\mathbf{1 7}$ is a formulae sheet to be used for the exam. This page may be removed.
4. Part I should be completed on the answer sheet (Page 18). This page may be removed.
5. Answers to the constructed response questions for Part II are to be placed on this paper in the spaces provided.
6. For Part II items, candidates are reminded to show ALL necessary steps and calculations. Partial credit may be awarded for logical work even though you might not arrive at the correct solution. Correct answers without appropriate calculations will not merit full marks.
7. A self-powered calculator may be used for calculations and to obtain special values. Graphing calculators are to be reset before the examination begins.

## REGULATIONS FOR CANDIDATES

Candidates are expected to be thoroughly familiar with all regulations pertaining to their conduct during examinations. Candidates must comply with all requirements governing the following matters.

- Materials required
- Leaving the room
- Materials not permitted
- Models of calculators permitted
- Use of pen or pencil
- Use of unauthorized means and penalties
- Completion of required information
- Communication during the exam


## Part II

## Total Value: 35 Marks

## Value

3
36. Tennis ball are sold 3 per package in a sealed cylindrical tube with a height of 8.5 inches. Each tennis ball has a diameter of 2.7 inches. Calculate the amount of empty space in the tube.

$$
\begin{array}{rlr}
V_{\text {cylinder }} & =\pi r^{2} h & \\
& =(3.14)(1.35)^{2}(8.5) & 0.5 \text { marks } \\
& =48.6 \mathrm{in}^{3} & 0.5 \text { marks }
\end{array}
$$

$$
V_{t b}=\frac{4}{3} \pi r^{3}
$$

$$
=\frac{4}{3}(3.14)(1.35)^{3}
$$

$$
=10.30 \mathrm{in}^{3}
$$

$$
0.5 \text { marks }
$$

$$
V_{c y l i n d e r}-3 \times V_{t b}
$$

$$
=48.6 \text { in }^{3}-\left(3 \times 10.30 \text { in }^{3}\right)
$$

$$
0.5 \text { marks }
$$

$$
=17.7 \mathrm{in}^{3}
$$



3 37. A) The surface area of a cube is $294 \mathrm{~cm}^{3}$. What is the volume of the cube?

$$
S . A .=6 \times s^{2}
$$

| $\frac{294}{6}$ | $=s^{2}$ | 0.5 |
| ---: | :--- | ---: | :--- |
| 49 | $=s^{2}$ | 0.5 |
| $\sqrt{49}$ | $=s$ | 0.5 |
| 7 cm | $=s$ | 0.5 |

$$
\begin{array}{rlr}
V & =s^{3} & \\
& =7^{3} & 0.5 \\
& =343 & 0.5
\end{array}
$$

Value
$3 \quad$ 37. B) Simplify: $\frac{\left(3 x^{-1} y^{2}\right)^{2}\left(2 x^{2} y^{-1}\right)^{3}}{9 x^{2} y^{3}}$ contain only positive exponents

$$
\begin{array}{ll}
=\frac{\left(9 x^{-2} y^{4}\right)\left(8 x^{6} y^{-1}\right)}{9 x^{2} y^{3}} & \\
=\frac{7 \text { mark }(0.5 \text { for each bracket }}{9 x^{2} y^{3}} & \\
=8 x^{2} y^{-2} & 1 \text { mark } \\
=\frac{8 x^{2}}{y^{2}} & 0.5 \\
& 0.5
\end{array}
$$

2
38. A) Factor: $\quad 36 x^{2}-15 x-6$

| $36 x^{2}-15 x-6$ |  |
| :--- | ---: |
| $=3\left(12 x^{2}-5 x-2\right)$ | 0.5 |
| $=3\left(12 x^{3}-8 x+3 x-2\right)$ | 0.5 |
| $=3[4 x(3 x-2)+1(3 x-2)]$ | 0.5 |
| $=3(3 x-2)(4 x+1)$ | 0.5 |

$$
\begin{array}{ll}
\left(3 x^{2}+4 y\right)\left(2 x^{2}-7 x y+4 y\right) & \\
=6 x^{4}-21 x^{3} y+12 x^{2} y+8 x^{2} y-28 x y^{2}+16 y^{2} & 2 \text { marks } \\
=6 x^{4}-21 x^{3} y+20 x^{2} y-28 x y^{2}+16 y^{2} & 1 \text { marks }
\end{array}
$$

* Deduct 0.5 marks for each incorrect distribution.

Value
38. C) Determine the simplified expression that would represent the area of the shaded region.
$(2 x-5)$


| $(2 x-5)(3 x+4)-[2(x-1)(x-1)]$ | 0.5 marks |
| :--- | :--- |
| $=6 x^{2}+8 x-15 x-20-\left[2\left(x^{2}-2 x+1\right)\right]$ | 1.0 mark |
| $=6 x^{2}-7 x-20-2 x^{2}+4 x-2$ | 1.0 mark |
| $=4 x^{2}-3 x-22$ | 0.5 marks |

39. A) The function $C(n)=0.70 n+8$, represents the cost, C , in dollars, of downloading $n$ songs from an online music store.
i) Determine $C(46)$. What does this number represent?

$$
\begin{aligned}
C(46) & =0.70(46)+8 & & 0.5 \text { marks } \\
& =\$ 40.20 & & 1.0 \text { mark }
\end{aligned}
$$

It will cost $\$ 40.20$ to download 46 songs ( 0.5 marks)
ii) Determine the value of $n$ when $C(n)=67.50$. What does this number represent?

$$
\begin{array}{rlrl}
67.50 & =0.70 n+8 & 0.5 \\
67.50-8 & =0.70 n & & 0.5 \\
\frac{59.50}{0.70} & =\frac{0.70 n}{0.70} & & 0.5 \\
85 & =n & &
\end{array}
$$

85 songs downloaded will cost $\$ 67.50$. (0.5)
39. B) Sketch the graph that represents a car's speed given:

- It travels at $80 \mathrm{Km} / \mathrm{h}$ for 10 seconds.
- Over 5 seconds it slows down at a constant rate to $50 \mathrm{Km} / \mathrm{h}$.
- It travels at $50 \mathrm{Km} / \mathrm{h}$ for 15 seconds.
- It speeds up to $70 \mathrm{Km} / \mathrm{h}$ at a constant rate over 10 seconds.

*0.5 marks for each correct section of the graph.

40. A) A line passes through the points $(4,2)$ and $(-8,6)$. Determine the equation of the line in general form. $(A x+B y+C=0)$.

$$
\begin{array}{rl}
\text { slope }=\frac{6-2}{-8-4}=\frac{4}{-12}=-\frac{1}{3} & 1.0 \text { mark } \\
y-2=-\frac{1}{3}(x-4) & 0.5 \text { marks } \\
-3(y-2)=x-4 & 0.5 \text { marks } \\
-3 y+6=x-4 & 0.5 \text { marks } \\
0=x+3 y-10 & 0.5 \text { marks }
\end{array}
$$

Students may also use the slope-intercept form to obtain the answer.

Value
3 40. B) Show that $\triangle A B C$ is a right triangle

$$
m_{A B}=\frac{-4-1}{-2-(-5)}=\frac{-5}{-2+5}=-\frac{5}{3} \quad(1 \operatorname{mark})
$$

$$
m_{B C}=\frac{2-(-4)}{8-(-2)}=\frac{2+4}{10}=\frac{6}{10}=\frac{3}{5} \quad(1 \operatorname{mark})
$$

Since the slopes are negative reciprocals thelines are perpendicular. If $\overline{A B} \perp \overline{B C}$, then $\angle A B C=90^{\circ}$, and $\triangle A B C$ is a right triangle. (1 mark)

41. James is building towers using white and grey cubes. When he stacks 6 white cubes on 3 grey cubes, the tower is 7.5 feet high. When he stacks 2 white cubes on 5 grey cubes, the tower is 6.5 feet high. Write and algebraically solve a system of equations to determine $x$ and $y$ in inches.


$$
0.5 \text { for correct system }
$$

$$
6 x+3 y=7.5
$$

$$
2 x+5 y=6.5
$$

$$
3 \times(2 x+5 y=6.5)
$$

$$
6 x+15 y=19.5
$$

$$
\begin{aligned}
& 6 x+3 y=7.5 \\
& -6 x+15 y=19.5 \\
& \mathbf{- 1 2 y}=\mathbf{- 1 2} \quad 1.5 \text { for correct solving } \\
& y=1 \\
& \text { So, } y=1 \mathrm{ft}=12 \text { inches } \\
& 6 x+3(1)=7.5 \\
& \mathbf{6 x}=\mathbf{4 . 5} \quad 1.0 \text { for conversion } \\
& x=0.75 \\
& \text { So, } x=0.75 \mathrm{ft}=9 \text { inches }
\end{aligned}
$$

Value
3
42. Find the area of the circle with centre 0 .

| $\cos 40^{\circ}$ | $=\frac{4}{d}$ | 0.5 |
| ---: | :--- | ---: |
| $d$ | $=\frac{4}{\cos 40^{\circ}}$ | 0.5 |
| $d \cong 5.22$ | 0.5 |  |
| $r \cong 2.6$ | 0.5 |  |
|  |  |  |
| $A=\pi(2.6)^{2}$ | 0.5 |  |
| $A=21.4 \mathrm{~cm}^{2}$ | 0.5 |  |



