CARLINGFORD HIGH SCHOOL

DEPARTMENT OF MATHEMATICS

Year 10 5.1 Mathematics

Term 3 Test

2017

Name : _____ **Time allowed : 55 minutes**

Class: 10M5.1 **Teacher: Mr GonG**

Instructions:

- All necessary working should be shown in the spaces provided.
- Marks will not be awarded for careless or badly arranged work.
- Board approved calculators may be used.
- Complete the examination in blue or black pen.

	Algebra	Pythagoras	Trigonometry	Indices	Total
Mark	/28	/9	/23	/24	/84

Algebra (28 marks) Show working where necessary

1. Convert 'twice the sum of x and y into an algebraic expression. **[1]**

A $x + y$ **B** $2x + y$

C $2(x + y)$ **D** $x + 2y$

2. Find an algebraic expression for the area of a square of side $4a$. **[1]**

A $4a^2$ **B** $16a$

C $8a$ **D** $16a^2$

3. To find triple the sum of two numbers, which is the correct order ? **[1]**

A multiply by 3 and then add

B divide by 3 and then add

C add and then multiply by 3

D add and then divide by 3

4. How many minutes are there in x hours? **[1]**

A $x + 60$ **B** $\frac{x}{60}$

C 60 **D** $60x$

5. Simplify $3x - 5y - 2x + 8y$. **[1]**

A $x - 13y$ **B** $x + 3y$

C $5x + 3y$ **D** $-5x - 13y$

6. If $a = -6$ and $b = 0.3$, evaluate $12 - 2a + b$. **[2]**

7. Simplify $16xy - 4x - y + 2yx$. **[2]**

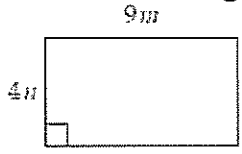
8. Simplify $-4x \times (-3y)$. **[2]**

9. Simplify $-9uv \times (-7vw)$. **[2]**

10. Simplify $36ab \div (-4b)$. **[2]**

11. Simplify $\frac{-15bc}{-25ac}$. **[2]**

12. Find a simplified algebraic expression for the area of this rectangle. **[2]**



13. Is each equation true or false ? (Justify)

a). $5(3a - 1) = 15a - 1$ **[2]**

b). $-4(3x + 2) = -12x - 8$ **[2]**

14. Expand and simplify $2(5m - 1) - (m + 3)$. **[2]**

15. Factorise each expression.

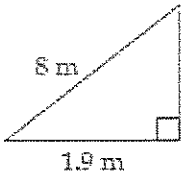
a). $8a - 12b$ **[1]**

b). $8x^2 - 28xy$ **[2]**

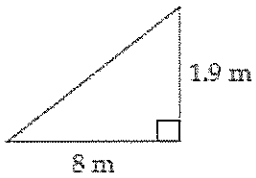
Pythagoras (9 marks) Show working where necessary

1. Paul leans a ladder against a 8 m high wall so that it reaches the top of it.
He places the ladder 1.9 m from the base of the wall.
Which is the correct diagram for this situation? Select A, B or C. **[1]**

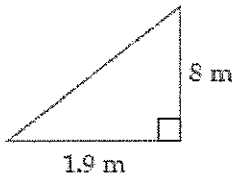
A



B



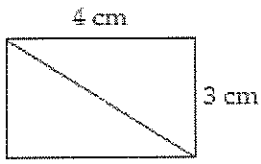
C



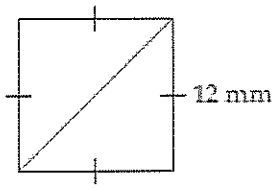
2. Find, correct to 2 decimal places, the length of the ladder in question 1. [Hint: $c^2 = a^2 + b^2$] **[2]**

3. Find the length of the diagonal in the rectangle and square correct to the nearest whole number. **[4]**

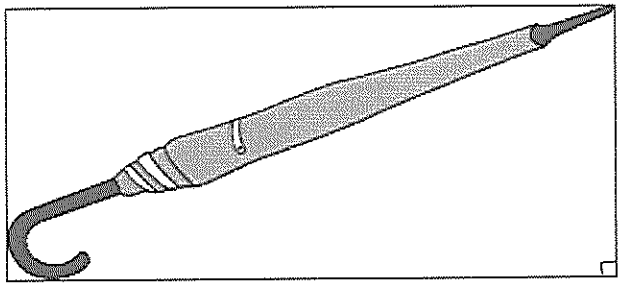
a).



b).



4. Find, correct to 1 decimal place, the length of the longest umbrella that can fit inside a suitcase measuring 1.5 m long & 0.6 m wide. **[2]**



Trigonometry (23 marks) Show working where necessary

1. In a right-angled triangle, what is the hypotenuse? **[1]**

A the shortest side

B the side opposite the marked angle

C the side opposite the right angle

D the side adjacent to the marked angle

2. Which phrase describes the side a in ΔABC? **[1]**

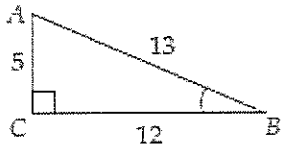
A opposite the right angle

B opposite angle A

C adjacent to angle A

D opposite the hypotenuse

3. For ΔABC, find the value of cos B. **[1]**



A $\frac{12}{13}$ **B** $\frac{5}{12}$ **C** $\frac{5}{13}$ **D** $\frac{12}{5}$

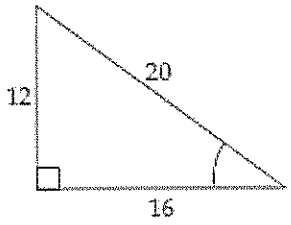
4. Evaluate $6.4\tan 36^\circ$ correct to 2 decimal places. **[1]**

A 4.64 **B** 46.49 **C** 12.56 **D** 4.65

5. For this triangle, which side is adjacent to the marked angle? **[1]**

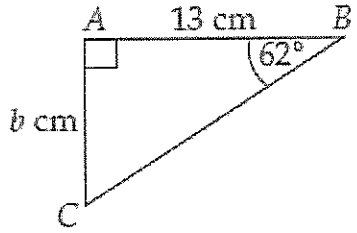
A 20 **B** 16

C 12 **D** 12 or 16

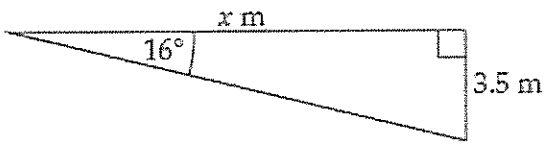


6. Find the value of each pronumeral, correct to 2 decimal places. **[4]**

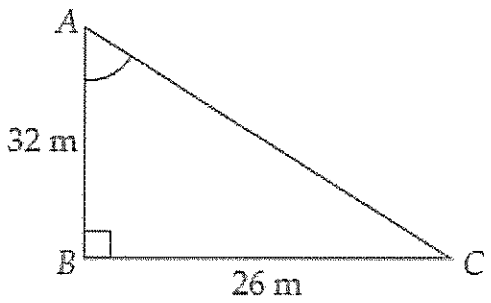
a).



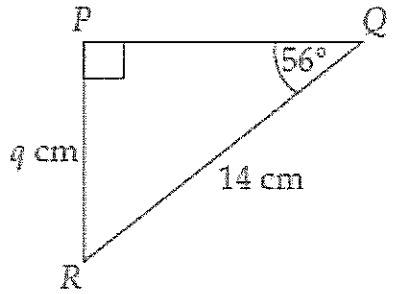
b).



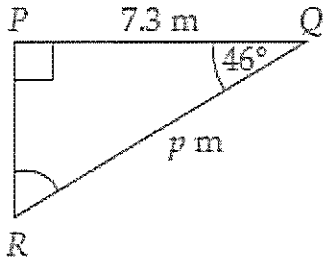
7. Find the size of $\angle A$, correct to the nearest degree. **[2]**



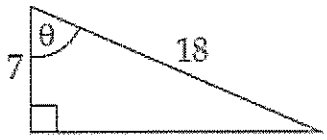
8. Find the value of q in the triangle below, correct to 1 decimal place. **[2]**



9. Find the value of p in the triangle below, correct to 1 decimal place. **[2]**



10. Find the value of θ in the triangle below, correct to the nearest degree **[2]**



11. Find the angle of elevation when looking up at a 36 m high hill from a point on the ground that is 18 m from the foot of the hill, to the nearest degree. **[2]**

12. Write each compass bearing as a three-figure bearing (True bearing). **[2]**

a). NE **b). SE**

13. Steven charted a yacht from a port and then sailed 125° from north for 12 km.
How far is he east of the port, correct to 2 decimal places? **[2]**

Indices (24 marks) Show working where necessary

1. Simplify $4^2 \times 4^5$. **[1]**

A 4^{10} **B** 16^{10}

C 4^7 **D** 16^7

2. Simplify $(3^3)^2$. **[1]**

A 3^5 **B** 27^5

C 3^6 **D** 27^2

3. Write $\frac{2}{x^5}$ with a negative index. . **[1]**

A $32x^{-5}$ **B** $5x^{-2}$

C $2x^{-5}$ **D** $25x^{-5}$

4. When multiplying terms with the same base, the indices are ? **[1]**

A added **B** subtracted

C multiplied **D** divided

5. Write 32 724 correct to 2 significant figures. . **[1]**

A 32 000 **B** 33

C 32 **D** 33 000

6. Simplify $(n^3)^7$. **[1]**

7. Simplify $\left(\frac{m^2}{n}\right)^4$. **[2]**

8. Simplify $4x^0$. **[1]**

9. Simplify $\frac{1}{3}x^{-5}$. **[2]**

10. Simplify $(2a^4)^2 \times 6a^o$. **[2]**

11. Round each number to 2 significant figures. **[2]**

a). 516 670 **b).** 0.003 277 6

12. Write each number in scientific notation. **[4]**

a). 452 200 **b).** 0.000 724

13. List these numbers in descending order: 6×10^{-4}, 7.2×10^{6}, 5.6×10^{-4}. [1]

14. Evaluate each expression, correct to 2 significant figures. **[4]**

a). $(8.35 \times 10^{8}) \times (1.08 \times 10^{-3})$ **b).** $\frac{12.65 \times 10^{14}}{8.4 \times 10^{-6}}$

END OF EXAM

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Name : Answers

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Algebra (28 marks) Show working where necessary

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A $x+y$ **B** $2x+y$

C $2(x+y)$ **D** $x+2y$

2. Find an algebraic expression for the area of a square of side $4a$. [1]

A $4a^2$ **B** $16a$

C $8a$ **D** $16a^2$

3. To find triple the sum of two numbers, which is the correct order ? [1]

A multiply by 3 and then add

B divide by 3 and then add

C add and then multiply by 3

D add and then divide by 3

4. How many minutes are there in x hours? [1]

A $x+60$ **B** $\frac{x}{60}$

C 60 **D** $60x$

5. Simplify $3x-5y-2x+8y$. [1]

A $x-13y$ **B** $x+3y$

C $5x+3y$ **D** $-5x-13y$

6. If $a=-6$ and $b=0.3$, evaluate $12-2a+b$. [2]

$=12-2(-6)+0.3$ ✓

$=24.3$ ✓

7. Simplify $16xy-4x-y+2yx$. [2]

$=18xy-4x-y$ ✓ ✓

8. Simplify $-4x\times(-3y)$. [2]

$=12xy$ ✓ ✓

9. Simplify $-9uv\times(-7vw)$. [2]

$=63uv^2w$ ✓ ✓

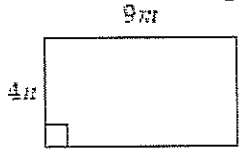
10. Simplify $36ab\div(-4b)$. [2]

$=-9a$ ✓ ✓

11. Simplify $\frac{-15bc}{-25ac}$. [2]

$=\frac{3b}{5a}$ ✓ ✓

12. Find a simplified algebraic expression for the area of this rectangle. [2]



$A=9m\times4n$ ✓

$=36mn$ ✓

13. Is each equation true or false ? (Justify)

a). $5(3a-1)=15a-1$ **[2]**

$15a-5 \neq 15a-1$ ✓

LHS ≠ RHS

False ✓

b). $-4(3x+2)=-12x-8$ **[2]**

$-12x-8=-12x-8$ ✓

LHS = RHS

True ✓

14. Expand and simplify $2(5m-1)-(m+3)$. **[2]**

$=10m-2-m-3$ ✓

$=9m-5$ ✓

15. Factorise each expression.

a). $8a-12b$ **[1]**

$=4(2a-3b)$ ✓

b). $8x^2-28xy$ **[2]**

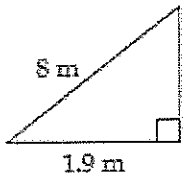
$=4x(2x-7y)$

✓ ✓

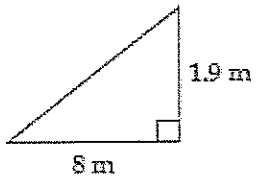
Pythagoras (9 marks) Show working where necessary

1. Paul leans a ladder against a 8 m high wall so that it reaches the top of it.
He places the ladder 1.9 m from the base of the wall.
Which is the correct diagram for this situation? Select A, B or C. **[1]**

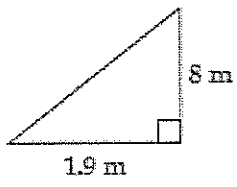
A



B



C



2. Find, correct to 2 decimal places, the length of the ladder in question 1. [Hint: $c^2 = a^2 + b^2$] **[2]**

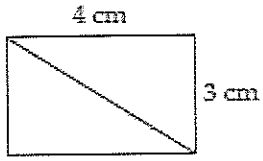
$l^2 = 1.9^2 + 8^2$ ✓

$l = \sqrt{1.9^2 + 8^2}$

$\doteq 8.22\text{m}$ ✓

3. Find the length of the diagonal in the rectangle and square correct to the nearest whole number. **[4]**

a).

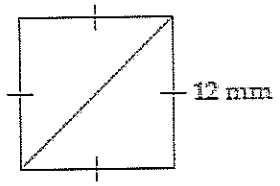


$l^2 = 3^2 + 4^2$ ✓

$l = \sqrt{3^2 + 4^2}$

$\therefore l = 5\text{cm}$ ✓

b).



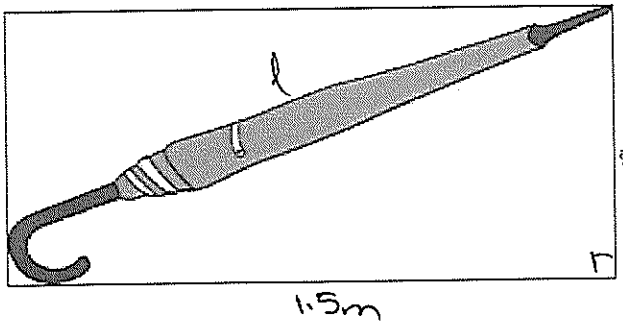
$l^2 = 12^2 + 12^2$ ✓

$l = \sqrt{12^2 + 12^2}$

$= 16.970\ldots$

$\therefore l \doteq 17\text{mm}$ ✓

4. Find, correct to 1 decimal place, the length of the longest umbrella that can fit inside a suitcase measuring 1.5 m long & 0.6 m wide. **[2]**



$l^2 = 1.5^2 + 0.6^2$ ✓

$l = \sqrt{1.5^2 + 0.6^2}$

$\doteq 1.6\text{m}$ ✓

Trigonometry (23 marks) Show working where necessary

1. In a right-angled triangle, what is the hypotenuse? **[1]**

A the shortest side

B the side opposite the marked angle

C the side opposite the right angle

D the side adjacent to the marked angle

2. Which phrase describes the side a in ΔABC? **[1]**

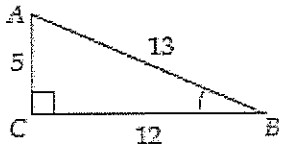
A opposite the right angle

B opposite angle A

C adjacent to angle A

D opposite the hypotenuse

3. For ΔABC, find the value of $\cos B$. **[1]**



A $\frac{12}{13}$ **B** $\frac{5}{12}$ **C** $\frac{5}{13}$ **D** $\frac{12}{5}$

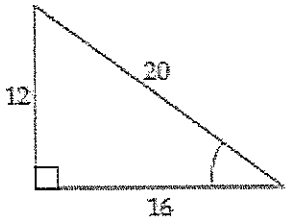
4. Evaluate $6.4\tan 36^\circ$ correct to 2 decimal places. **[1]**

A 4.64 **B** 46.49 **C** 12.56 **D** 4.65

5. For this triangle, which side is adjacent to the marked angle? **[1]**

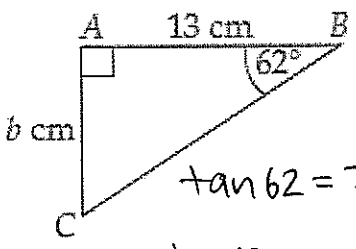
A 20 **B** 16

C 12 **D** 12 or 16



6. Find the value of each pronumeral, correct to 2 decimal places. **[4]**

a).

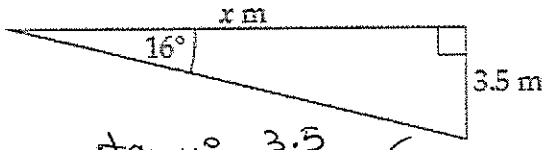


$\tan 62 = \frac{b}{13}$ ✓

$b = 13 \times \tan 62$

$\therefore b \doteq 24.45$ cm ✓

b).

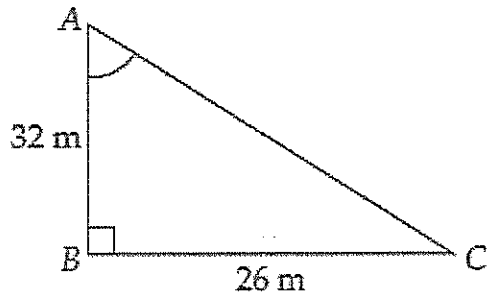


$\tan 16^\circ = \frac{3.5}{x}$ ✓

$x = \frac{3.5}{\tan 16^\circ}$

$x \doteq 12.21$ m ✓

7. Find the size of $\angle A$, correct to the nearest degree. **[2]**

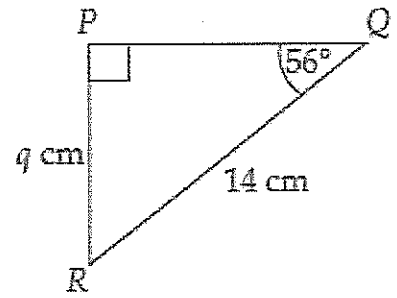


$\tan A = \frac{26}{32}$ ✓

$A = \tan^{-1}\left(\frac{26}{32}\right)$

$\therefore A \doteqdot 39^\circ$ ✓

8. Find the value of q in the triangle below, correct to 1 decimal place. **[2]**

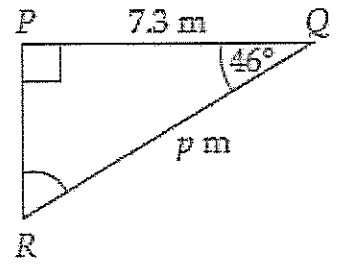


$\sin 56^\circ = \frac{q}{14}$ ✓

$q = 14 \times \sin 56^\circ$

$\therefore q \doteqdot 11.6\text{cm}$ ✓

9. Find the value of p in the triangle below, correct to 1 decimal place. **[2]**

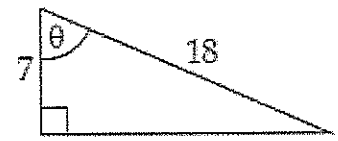


$\cos 46^\circ = \frac{7.3}{p}$ ✓

$p = \frac{7.3}{\cos 46^\circ}$

$\therefore p \doteqdot 10.5_m$ ✓

10. Find the value of θ in the triangle below, correct to the nearest degree **[2]**

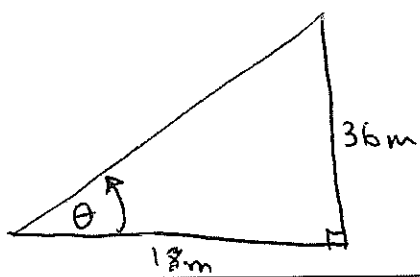


$\cos\theta = \frac{7}{18}$ ✓

$\theta = \cos^{-1}\left(\frac{7}{18}\right)$

$\therefore \theta \doteqdot 67^\circ$ ✓

11. Find the angle of elevation when looking up at a 36 m high hill from a point on the ground that is 18 m from the foot of the hill, to the nearest degree. **[2]**



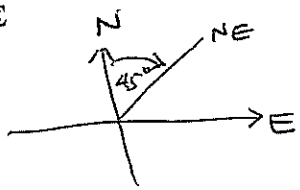
$\tan\theta = \frac{36}{18}$ ✓

$\theta = \tan^{-1}\left(\frac{36}{18}\right)$

$\therefore \theta \doteqdot 63^\circ$ ✓

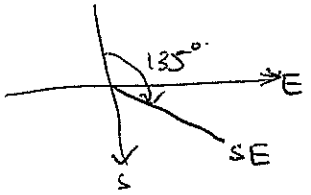
12. Write each compass bearing as a three-figure bearing (True bearing). **[2]**

a). NE



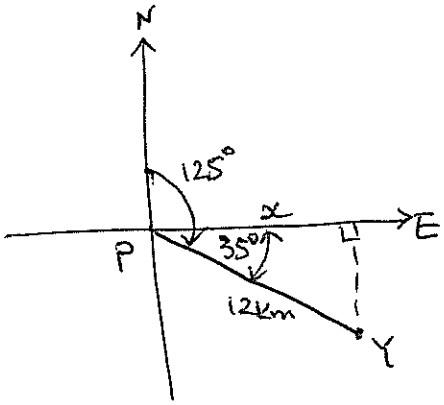
$\therefore 045^\circ$ ✓

b). SE



$\therefore 135^\circ$ ✓

13. Steven charted a yacht from a port and then sailed 125° from north for 12 km. How far is he east of the port, correct to 2 decimal places? **[2]**



$\cos 35^\circ = \frac{x}{12}$ ✓

$x = 12 \times \cos 35^\circ$

$\therefore x \doteq 9.83 \text{ km}$ ✓

Indices (24 marks) Show working where necessary

1. Simplify $4^2 \times 4^5$. **[1]**

A 4^{10} **B** 16^{10}

C 4^7 **D** 16^7

2. Simplify $(3^3)^2$. **[1]**

A 3^5 **B** 27^5

C 3^6 **D** 27^2

3. Write $\frac{2}{x^5}$ with a negative index. . **[1]**

A $32x^{-5}$ **B** $5x^{-2}$

C $2x^{-5}$ **D** $25x^{-5}$

4. When multiplying terms with the same base, the indices are ? **[1]**

A added **B** subtracted

C multiplied **D** divided

5. Write 32 724 correct to 2 significant figures. . **[1]**

A 32 000 **B** 33

C 32 **D** 33 000

6. Simplify $(n^3)^7$. **[1]**

$= n^{21}$ ✓

7. Simplify $\left(\frac{m^2}{n}\right)^4$. $= \frac{m^8}{n^4}$ ✓ ✓ **[2]**

8. Simplify $4x^0$. $= 4 \times 1$

$= 4$ ✓ **[1]**

9. Simplify $\frac{1}{3}x^{-5} = \frac{1}{3} \times \frac{1}{x^5}$ ✓ **[2]**

$= \frac{1}{3x^5}$ ✓

10. Simplify $(2a^4)^2 \times 6a^0$. **[2]**

$= 4a^8 \times 6 \times 1$ ✓

$= 24a^8$ ✓

11. Round each number to 2 significant figures. **[2]**

a). 516 670

$\doteq 520\,000$ ✓

b). 0.003 277 6

$\doteq 0.0033$ ✓

12. Write each number in scientific notation. **[4]**

a). 452 200

$= 4.522 \times 10^5$ ✓ ✓

b). 0.000 724

$= 7.24 \times 10^{-4}$ ✓ ✓

13. List these numbers in descending order: 6×10^{-4}, 7.2×10^6, 5.6×10^{-4}. **[1]**

7.2×10^6, 6×10^{-4}, 5.6×10^{-4} ✓

14. Evaluate each expression, correct to 2 significant figures. **[4]**

a). $(8.35 \times 10^8) \times (1.08 \times 10^{-3})$

$= 901{,}800$ ✓

$\doteq 900\,000$ ✓

b). $\frac{12.65 \times 10^{14}}{8.4 \times 10^{-6}}$

$= 1.505952381 \times 10^{20}$ ✓

$\doteq 1.5 \times 10^{20}$ ✓

END OF EXAM