Student's Name: .....

Teacher's Name: .....

Barker College

(GPF) Mr Fitzmaurice
(ESP) Mrs Pratt
(ARP) Mr Perkins
(AYG) Mrs Henry
(DXC) Mr Chua
(LAK) Mrs Kalnins *
(RAS) Mr Smith

Monday 15 June 2020
Period 4 or 5
Time Allowed: 50 minutes

YEAR 9
MATHEMATICS 5.3

ASSESSMENT 2

170 copies

Earning Money
Trigonometry
Indices
Algebra
Products and Factors

INSTRUCTIONS TO STUDENTS

- **Write ALL answers in the space provided.**
- **ALL NECESSARY working for each question must be shown to gain full marks.**
- **Marks may not be awarded for careless or badly arranged working.**
- **DIAGRAMS ARE NOT TO SCALE**
- **Write in blue or black pen**
- **Board-approved, non-programmable calculators may be used.**

TOTAL: [63 marks]

* * * *

Section 1: Financial Mathematics (18 marks)

Marks

1. Aiden started a new job at the supermarket where he was paid $12.50 per hour. He received **time-and-a-half** payment on Saturdays and **double time** payment on Sundays.

(i) Complete the table below by calculating the money he earnt on each day: **3**

	Mon	Tues	Wed	Thurs	Fri	Sat	Sun
Hours	0	2.5	0	4	0	4	3
Pay							

(ii) Hence calculate how much Aiden earnt in that week **1**

2. Bernadette earnt a salary of $56 500 p.a.

(i) Calculate her fortnightly pay, given that there are 52 weeks per year. **1**

(ii) Her boss decided to start paying everyone once per month. How much is Bernadette's monthly pay? **1**

3. Chris was planning a two-week holiday. His salary was $86 000. **2**
How much extra would he receive, over the two weeks, due to the leave loading bonus of 17.5%?

4. Dorothy had an annual salary of $88 500.
In addition to her regular pay she earnt a bonus which was 5% of her annual salary for completing a project ahead of schedule.
Her deductions comprised a $300 donation to a charity and annual union fees of $600.

(i) Calculate Dorothy's **taxable income** for the year **2**

(ii) Using the income tax table below, calculate her **income tax** payable **2**

Taxable income	Tax on this income
0 – $18,200	Nil
$18,201 – $37,000	19c for each $1 over $18,200
$37,001 – $90,000	$3,572 plus 32.5c for each $1 over $37,000
$90,001 – $180,000	$20,797 plus 37c for each $1 over $90,000
$180,001 and over	$54,097 plus 45c for each $1 over $180,000

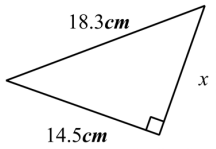
(iii) If $390 of PAYG tax was withheld each week, would Dorothy receive a tax rebate or would she owe some extra money? How much would that amount be? **3**

(iv) Dorothy paid $22 647 in tax for the year. What was her **taxable income**? **3**

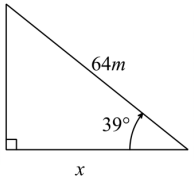
Section 2: Trignometry (14 marks)

Marks

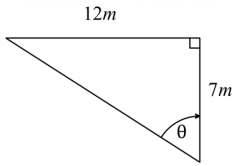
5. Evaluate the missing side to 1 d.p. **2**



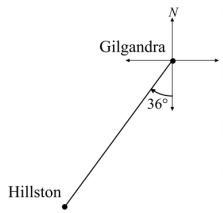
6. Solve the following, answering to 2 d.p. **2**



7. Find the missing angle, to the nearest minute **3**



8. The towns of Gilgandra and Hillston can be found in the central west region of NSW and are illustrated in the diagram below.



(i) What is the **True** bearing of Hillston from Gilgandra? **1**

(ii) If the distance between Hillston and Gilgandra is 434km, how far **south** of Gilgandra is Hillston? **2**

(iii) What is the true bearing of Gilgandra from Hillston? **1**

9. Francis was safely lying at the edge of a cliff looking out to sea when he saw a ship. He knew the cliff was 50m above sea level and he measured the angle of depression to the ship to be 8°.

(i) Add this information to the diagram below: **1**

(ii) Evaluate how far the ship was out to sea, to the nearest metre. **2**

Section 3: Indices, Algebra, Products and Factors (24 marks)

Marks

10. Evalute the following, writing your answer to 3 significant figures: **2**

$$\sqrt[3]{\frac{3\times 6.2^2}{4\pi}} =$$

11. Write the following in scientific notation: **1**

3450000

12. Write the following as a basic numeral: **1**

4.62×10^{-4}

13. Simplify the following expressions, using only positive indices

a. $a^2 \times a^3 =$ **1**

b. $a^5 b^6 \div b^2 =$ **1**

c. $\left(c^4\right)^3 =$ **1**

d. $d^{-3} =$ **1**

e. $6x^{-2} =$ **1**

14. Evaluate

a. $2e^0 =$ **1**

b. $\left(3f^4\right)^0 =$ **1**

c. $\left(125g^9\right)^{\frac{1}{3}} =$ **2**

15. Simplify the following fractions

a. **2**

$$\frac{4x^2y^3}{6xy^5} =$$

b. **3**

$$\frac{2x^3y}{9z^4} \div \frac{8xy^2}{15z} =$$

16. Simplify this fraction by first factorising **4**

$$\frac{x^2-9}{x^2+x-2} \times \frac{x^2-1}{x^2-6x+9}$$

17. Factorise $6x^2 + x - 2$ **2**

Section 4: Challenge (7 marks)

Marks

18. Solve $\frac{27^x}{3} = 9^{3x}$ **2**

19. A cruise ship captain saw a yacht 5.2 km away on a bearing of 214°T. She also saw a whale 650m away on a bearing of 304°T.

(i) Draw a diagram that represents all this information. **2**

(ii) How far is the yacht from the whale (2.d.p.)? **1**

(iii) What is the bearing of the whale from the yacht (nearest degree)? **2**

END OF PAPER

YEAR 9 (5.3 MATHEMATICS)

ASSESSMENT 2 (2020)

(1) i) TOES: $2.5 \times 12.5 = \$31.25$

THURS: $4 \times 12.5 = \$50$

SAT: $1.5 \times 4 \times 12.5 = \$75$

SUN: $2 \times 3 \times 12.5 = \$75$

ALL OTHER DAYS = \$0

ii) $\$31.25 + \$50 + \$75 + \$75$

$= \$231.25$

(2) i) $\frac{56500}{26} = \$2173.08$

ii) $\frac{56500}{12} = \$4708.33$

(3) Weekly wage $= \frac{86000}{52}$

$= \$1653.85$

leave loading $= 0.175 \times 1653.85 \times 2$

$= \$578.85$

(4) bonus $= 88500 \times 0.05$

$= \$4,425$

i) $88500 + 4425 - 300 - 600$

$= \$92025$

ii) $20797 + 0.37(92025 - 90000)$

$= \$21\,546.25$

iii) Tax paid $= 390 \times 52$

$= \$20\,280$

Dorothy owes $21\,546.25 - 20\,280$

$\$1266.25$

iv) $22647 = 20797 + 0.37(x - 90000)$

$1850 = 0.37(x - 90000)$

$\frac{1850}{0.37} = x - 90000$

$x = \$95000$

(5) $x^2 = 18.3^2 - 14.5^2$

$= 124.64$

$x = 11.2$ cm

(6) $\cos 39^\circ = \frac{x}{64}$

$x = 64 \cos 39^\circ$

$= 49.74$ m

(7) $\tan\theta = \frac{12}{7}$

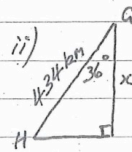
$\theta = \tan^{-1}\left(\frac{12}{7}\right)$

$= 59.743\ldots$

$= 59^\circ 45'$

(8) i) $180 + 36 = 216^\circ$

ii)

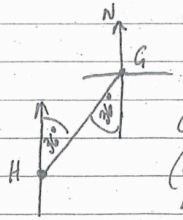


$\cos 36^\circ = \frac{x}{434}$

$x = 434 \cos 36^\circ$

$= 351$ km

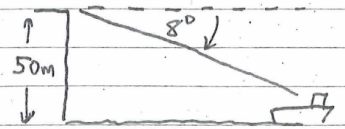
iii)



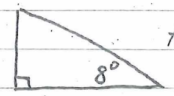
036°

(alternate angles in parallel lines)

(9) i)



ii)



$\tan 8^\circ = \frac{50}{x}$

$x = \frac{50}{\tan 8^\circ}$

$= 355.768\ldots$

$= 356$m

(10) $2.0936\ldots$

$= 2.09$

(11) 3.45×10^6

(12) 0.000462

(13) a) a^5

b) $a^5 b^4$

c) c^{12}

d) $\frac{1}{d^3}$

e) $6 \times x^{-2} = 6 \times \frac{1}{x^2} = \frac{6}{x^2}$

(14) a) $2 \times 1 = 2$

b) 1

c) $\sqrt[3]{125 g^3} = 5g^3$

(15) a) $\frac{2x}{3y^2}$

b) $\frac{2x^3y}{9z^4} \times \frac{15z}{8xy^2} = \frac{x^2}{3z^3} \times \frac{5}{4y}$

$= \frac{5x^2}{12yz^3}$

(16) $\frac{(x-3)(x+3)}{(x+2)(x-1)} \times \frac{(x-1)(x+1)}{(x-3)^2}$

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

(17) $6x^2 - 3x + 4x - 2$

$= 3x(2x-1) + 2(2x-1)$

$= (3x+2)(2x-1)$

ac	b
-12	1

$-3, 4$

(18) $\frac{(3^3)^x}{3} = (3^2)^{3x}$

$3^{3x} \div 3^1 = 3^{6x}$

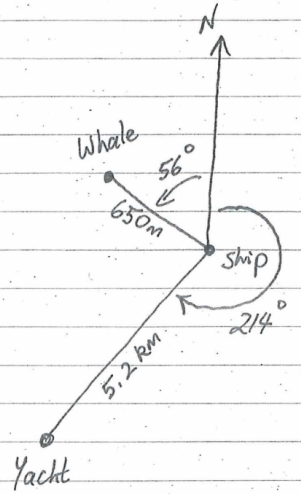
$3^{3x-1} = 3^{6x}$

$\therefore 3x - 1 = 6x$

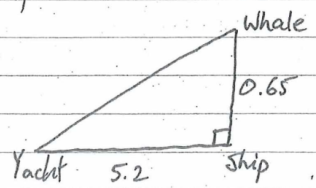
$-1 = 3x$

$x = \frac{-1}{3}$

(19) i)



ii) $360 - 214 - 56 = 90$



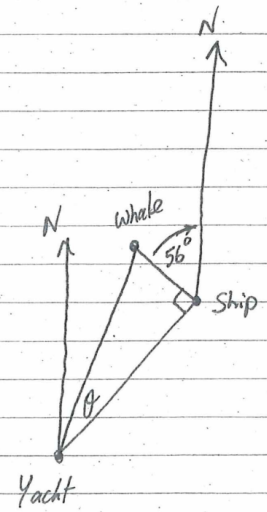
$dist = \sqrt{5.2^2 + 0.65^2}$

$= 5.24$ km

or

5240.47 m

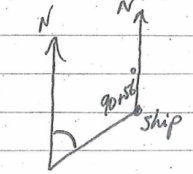
iii)



$\tan\theta = \frac{0.65}{5.2}$

$\theta = \tan^{-1}\left(\frac{0.65}{5.2}\right)$

$\doteq 7°$



$180 - (90+56)$

$= 34°$ Cointerior ∠'s on ∥

Bearing $= 34 - \theta$

$= 34 - 7$

$= 27°$