

KULLEGĠ SAN BENEDITTU Secondary School, Kirkop

Track

3

HALF YEARLY EXAMINATION – 2017/2018

YEAR 10

MATHEMATICS

MARKING SCHEME

Notes for Marking of Scripts

Types of Marks

Method marks are awarded for knowing a correct method of solution and attempting to apply it. Method marks cannot be lost for arithmetic mistakes. They can only be awarded if the method used would have led to the correct answer had not an arithmetic mistake been made. Unless otherwise stated, any valid method not specified in the marking scheme is to be accepted and marked accordingly.

There are two types of Method marks, **M** marks and **(M)** marks.

- **M marks**, are only awarded if method is seen.
- **(M) marks** are awarded even when a correct answer is given and no work is shown.

There are two types of Accuracy marks, **A** marks and **B** marks.

- **A** marks are accuracy marks given for correct answer only (c.a.o.).
 - * Incorrect answers, even though nearly correct, score no marks.
 - * Accuracy marks are also awarded for incorrect answers which are correctly followed through (f.t.) from an incorrect previous answer, **provided that f.t. is indicated in the marking scheme.**
 - * No Method marks **M/(M)** or Accuracy marks **A**, are awarded when a wrong method leads to a correct answer.
 - * When a question is assigned **M** and **A** marks and students present a correct answer without any working, only **A** marks are awarded.
- **B** marks are accuracy marks awarded for specific results or statements independent of the method used.

Misreading

Method marks can still be earned (unless that part of the question is trivialized) but the final Accuracy marks are lost.

Crossed out working

An answer or working that is crossed out and not replaced is marked as if it were not crossed out. If the answer or working is replaced, then the crossed out answer or working is ignored and should not be considered for marking.

Units

In general, missing or inaccurate units are not penalised unless otherwise indicated in the marking scheme.

Other

- Incorrect working or statement following a correct answer is ignored.
- Marks are not sub-divisible; no half marks may be awarded.
- Other abbreviations used:
 - * o.e. (or equivalent)
 - * e.e.o.o. (each error or omission)
- Markers are advised to indicate the **M**, **(M)**, **A** or **B** marks awarded in the body of the script and then write their total in the margin. The total mark for each question should be written in the table included at the top of page 1 of the main paper. This measure facilitates the moderation of papers.

Non-Calculator Paper (20 marks)

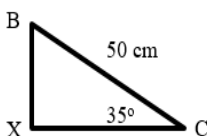
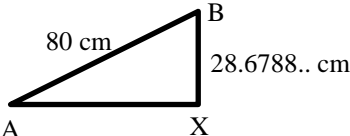
Each question carries 1 mark.

| Question 1 | Question 2 | Question 3 | Question 4 |
|-------------------------------|-----------------------------|-------------|--|
| 8 cm | $\frac{1}{2^2}$ or 2^{-2} | 1980 | 4×10^5 |
| Question 5 | Question 6 | Question 7 | Question 8 |
| $\frac{4}{5}$ or 0.8 | 2 | 100 | 4.5 |
| Question 9 | Question 10 | Question 11 | Question 12 |
| 87000 | B. | 25000 | Any positive odd number greater than 1 |
| Question 13 | Question 14 | Question 15 | Question 16 |
| Accept values between 2 and 3 | 73 | 5 | e.g. $x = 2$; $y = 3$ Accept other values such that $y = 1.5x$ |
| Question 17 | Question 18 | Question 19 | Question 20 |
| C. | 16 | A. | 96 |

Main Paper (80 marks)

| Quest. | Requirements | Mark | Additional Guidance | Total |
|----------|--|---|--|----------|
| 1 | a Perpendicular height of triangle ABE = 3 cm Area of triangle ABE = $\frac{3 \times 8}{2} = 12 \text{ cm}^2$ Area of BCDE = $8 \times 9 = 72 \text{ cm}^2$ Total Area = 84 cm² | (M)1 M1 A1 | For finding area of triangle and adding to area of square. Method mark for adding areas | 5 |
| | b Vol = Area of c s x length = $84 \text{ cm}^2 \times 12 \text{ cm} = \mathbf{1008 \text{ cm}^3}$ | M1 A1 | Seen or implied Followed through from part a | |
| 2 | a $60 = 2^2 \times 3 \times 5$ $108 = 2^2 \times 3^3$ | B1 B1 | Accept also if not in index form | 3 |
| | b $\text{HCF} = 2^2 \times 3 = \mathbf{12 \text{ cm}}$ | B1 | | |
| 3 | a Beg 2013 to End 2017 – 5 yrs $A = 6500(1 - \frac{8}{100})^5$ $A = 4284.029901$ = €4284 to nearest € | M1 M1 A1 | f.t if years taken as 4. | 5 |
| | b $6500 - 4284 = 2216$ $6500 = 100\%$ $2216 = ? \text{ less}$ $\frac{2216 \times 100}{6500} = \mathbf{34.09\%}$ | M1 A1 | Or any other valid method Accept 34 or more accurate | |

| Quest. | Requirements | | Mark | Additional Guidance | Total | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
|----------------------|----------------------------|---|--|--------------------------------------|-------|-----|-----------------------------|-----|-------------------------|----|----|---|----------------------|---|---|----|----|----|-----|-------------------------|---------------|---|---|---|---|---|----|---|---------------|---|---|----|----|----|-----|-----------------------------|----------------------|
| 4 | a | Area = bh | B1 | | 5 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | b | $Area = \frac{(a-b)h}{2}$ | B1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | c | Total Area $A = bh + \frac{(a-b)h}{2}$ $A = \frac{2bh+(a-b)h}{2}$ $A = \frac{2bh+ah-bh}{2}$ $A = \frac{ah+bh}{2} = \frac{h(a+b)}{2}$ | M1 M1 | For adding answers to parts a and b. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | d | $\frac{6(20+12)}{2} = 96\text{ cm}^2$ | A1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 5 | a | $x\text{-axis} \Rightarrow y = 0 \Rightarrow 0 = 2x + 5 \Rightarrow x = \frac{-5}{2}$ $A = (\frac{-5}{2}, 0)$ $y\text{-axis} \Rightarrow x = 0 \Rightarrow y = 2(0) + 5 \Rightarrow y = 5$ $B = (0, 5)$ | (M)1 A1 B1 | | 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | b | m=5 | B1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | c | Parallel \Rightarrow same gradient $\Rightarrow m=5$ Equation of straight line $y=mx+c$ $x=2$ and $y=9 \Rightarrow 9 = 5(2) + c$ $\Rightarrow c = -1$ So $y = 5x - 1$ | (M)1 A1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 6 | a | i. $4x(y + 5x)$ ii. $(x + 7)(x - 2)$ iii. $3(x^2 - 16) = 3(x - 4)(x + 4)$ iv. $(2x + 3)(x - 1)$ | B1 B1 M1 B1 B2 | M1 for 3 common factor | 13 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | b | i. $2x - 1$ ii. $3x^2 - 19x + 20$ iii. $4x^2 - 1$ iv. $10x - 6$ or $2(5x - 3)$ | B1 (M)1 A1 B2 M1 A1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 7 | a | Length = $5y - 6$ Width = $4y - 6$ $P = 2(5y - 6 + 4y - 6)$ $P = 18y - 24$ | M1 (M)1 A1 | For both dimensions correct | 6 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | b | $66 = 18y - 24 \Rightarrow 90 = 18y \Rightarrow y = 5\text{ cm}$ | M1 A1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | c | Length = $5(5) = 25\text{ cm}$ Width = $4(5) = 20\text{ cm}$ | B1 | For both correct | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| 8 | a | i) 13, 15 | B1 | | 11 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | ii) $2n + 3$ | B1 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | iii) $2(180) + 3 = 363$ | A1 f.t. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | b | i. | B1 B1 B1 B3 B1 A1 f.t | For correct 25, 36, 169 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | <table><tr><td>Shape no</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>12</td><td>n</td></tr><tr><td>Total num of squares</td><td>4</td><td>9</td><td>16</td><td>25</td><td>36</td><td>169</td><td>(n+1)² o.e.</td></tr><tr><td>black squares</td><td>1</td><td>2</td><td>3</td><td>4</td><td>5</td><td>12</td><td>n</td></tr><tr><td>white squares</td><td>3</td><td>7</td><td>13</td><td>21</td><td>31</td><td>157</td><td>(n+1)² - n o.e.</td></tr></table> | | Shape no | | 1 | 2 | 3 | 4 | 5 | 12 | n | Total num of squares | 4 | 9 | 16 | 25 | 36 | 169 | (n+1) ² o.e. | black squares | 1 | 2 | 3 | 4 | 5 | 12 | n | white squares | 3 | 7 | 13 | 21 | 31 | 157 | (n+1) ² - n o.e. | For correct 4, 5, 12 |
| | | Shape no | | 1 | | 2 | 3 | 4 | 5 | 12 | n | | | | | | | | | | | | | | | | | | | | | | | | | | |
| Total num of squares | | 4 | | 9 | 16 | 25 | 36 | 169 | (n+1) ² o.e. | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| black squares | 1 | 2 | 3 | 4 | 5 | 12 | n | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| white squares | 3 | 7 | 13 | 21 | 31 | 157 | (n+1) ² - n o.e. | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | For correct 21, 31, 157 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | | B1 for each correct entry in last column | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |
| | ii. 9th shape iii. 4971 | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | | |

| Quest. | | Requirements | Mark | Additional Guidance | Total |
|--------|---|---|--|---|-------|
| 9 | a | $20 \leq n < 30$ | 3 | e.e.o.o. | 5 |
| | | $30 \leq n < 40$ | 8 | | |
| | | $40 \leq n < 50$ | 7 | | |
| | | $50 \leq n < 60$ | 2 | | |
| | | $60 \leq n < 70$ | 4 | | |
| | b | Correct drawing of bars and labelling of axes | B2 | | |
| 10 | a | m=50 | B1 | | 5 |
| | b | ii. cost of one night at the hotel | B1 | | |
| | c | the cost of the flight | B1 | | |
| | d | $T = 100 + 50n$ | B2 | | |
| 11 | a | i) To find BQ - Using triangle ABQ $\tan 65 = \frac{5.2}{BQ} \quad BQ = \frac{5.2}{\tan 65}$ BQ = 2.42479 | M1 A1 | For correct use of trig ratio Accept 2.4 m or more accurate | 7 |
| | | ii) To find BX - Using triangle ABX $\tan 34 = \frac{5.2}{BX} \quad BX = \frac{5.2}{\tan 34}$ BX = 7.7093 | M1 A1 | Accept 7.7 m or more accurate | |
| | b | Working in ΔAPZ , where Z in the interesting point between the horizontal line through P, and AB. $\tan 34 = \frac{\text{difference in height}}{2.42479}$ Difference in height = 1.6355... m | M1 M1 A1 f.t. | Accept 1.6 m or more accurate | |
| 12 | a |  $\sin(35) = \frac{BX}{50}$ $50 \sin 35 = BX$ $BX = 28.6788... \text{ cm}$ $BD = BX \times 2$ $BD = 57.3576...$ BD = 57.4 cm | (M)1 M1 A1 | For correct use of properties of isosceles triangle to find angle 35° . For correct trig ratio. Correct rounded answer | 9 |
| | b | $AC = AX + XC$ Using triangle BXC to find XC $\cos 35 = \frac{XC}{50}$ $50 \cos 35 = XC$ $40.95760221... = XC$ Using triangle ABX to find AX  $AX = \sqrt{80^2 - 28.6788...^2}$ $= \sqrt{5577.525179...}$ $= 74.68283055...$ $AC = 40.9576 + 74.68283055... = 115.64...$ AC = 116 cm to 3sf | M1 M1 A1 M1 A1 | Seen or implied For correct use of trig ratio Correct rounded answer | |
| | c | $\text{Area of kite} = \left(\frac{115.64 \times 28.7}{2} \right) \times 2$ $\text{Area of Kite} = 3316.431366... \text{ cm}^2$ = 3320 | M1 | | |
| | | | | | |