

Algebra

Non-negotiable

1.1 Solve for x , correct to two decimal places: $-2x^2 + 7x - 2 = 0$ (3)

1.2 Solve for x : $\sqrt{5-x} - x = 1$ (5)

1.3 Simplify: $\frac{3^{2x+1} \cdot 15^{2x-3}}{27^{x-1} \cdot 3^x \cdot 5^{2x-4}}$ (4)



1.4 Solve for x and y simultaneously if:
 $x + 4 = 2y$ and $y^2 - xy + 21 = 0$ (6)

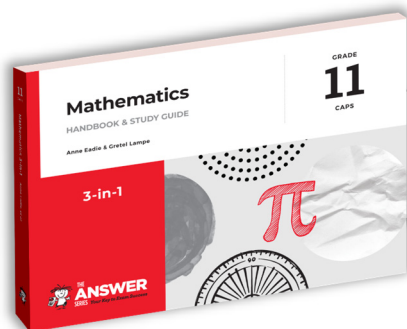
Take it up a notch

2.1 Determine, without the use of a calculator, the value of a , b and c such that:
 $(1 - \sqrt{3})(a + b\sqrt{c}) = -10 + 2\sqrt{3}$ (5)

2.2 Two hoses can fill a pool in 20 hours. If only one hose had been used at a time, the slower hose would have taken nine hours more than the faster hose to fill the pool. Determine the time taken by the faster hose to fill the pool. (6)

Reach for the stars

3. Determine two non-zero numbers such that their sum, their product, and their quotient are all equal. (4)



For further examples,
see pages 1.1 to 3.12 in the
Grade 11 Maths 3-in-1 Study Guide



Patterns

Non-negotiable

1. Consider the number of unit squares in the figures below.

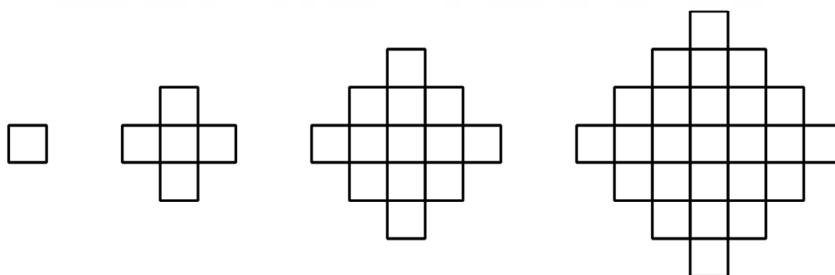


Fig. 1

Fig. 2

Fig. 3

Fig. 4

| Figure number | 1 | 2 | 3 | 4 |
|-------------------|---|---|----|----|
| Number of squares | 1 | 5 | 13 | 25 |

Determine the number of unit squares in the 100th figure.

(6)

Take it up a notch

2. The first four terms of a quadratic number pattern are 2; x ; y ; -37 .
The first three terms in the row of first differences of the same number pattern are $2p - 3$; $p^2 - 22$; $5p - 2$. Determine the value of x and y if $p \in \mathbb{Z}$.

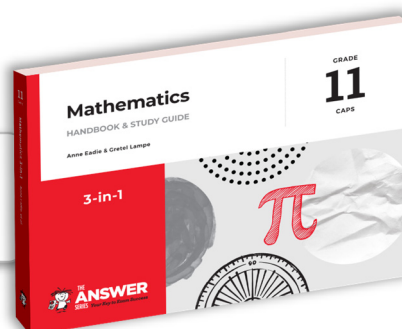
(6)

Reach for the stars

3. A quadratic sequence has the sixth term equal to 19, the ninth term equal to 55 and the eleventh term is 89. Determine the formula for the general term.

(7)

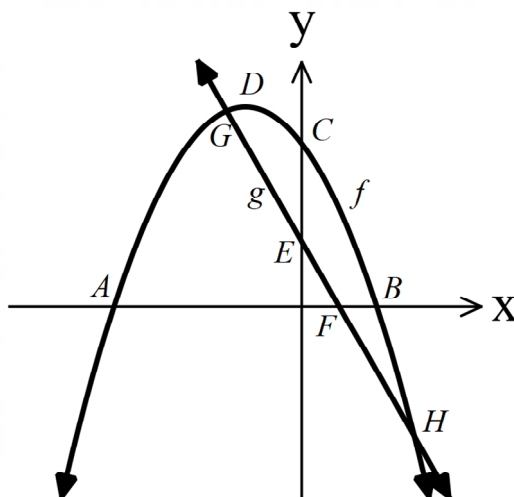
For further examples,
see pages 4.1 to 4.10 in the
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Functions

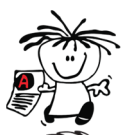
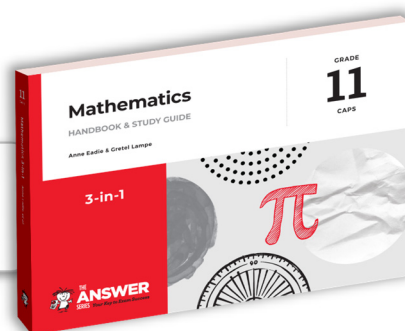
Non-negotiable

1. Given $f(x) = -3x^2 - 9x + 30$, with A and B the x -intercepts and D the turning point, and $g(x) = -12x + 12$.



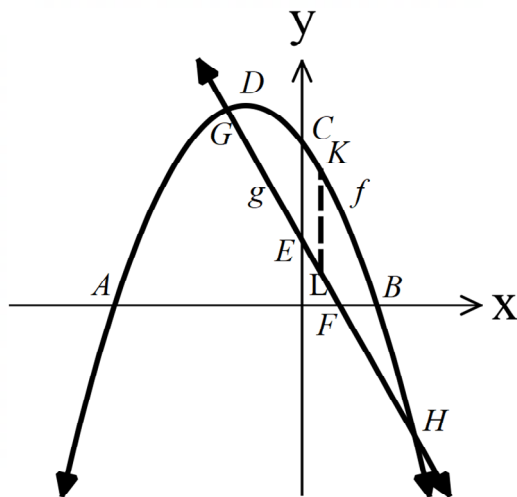
- 1.1 Determine the co-ordinates of A and B. (3)
- 1.2 Determine the co-ordinates of D. (2)
- 1.3 Determine the co-ordinates of G and H, the intersection of f and g . (4)
- 1.4 For what values of x is $f(x) > 0$? (2)
- 1.5 For what values of x is $f(x) \leq g(x)$? (2)
- 1.6 Write down the range of $f(x)$. (1)

For further examples,
see pages 6.1 to 6.32 in the
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Take it up a notch

2. Continue with $f(x) = -3x^2 - 9x + 30$ and $g(x) = -12x + 12$ from question 1. KL is a vertical line with K on f and L on g between points G and H.



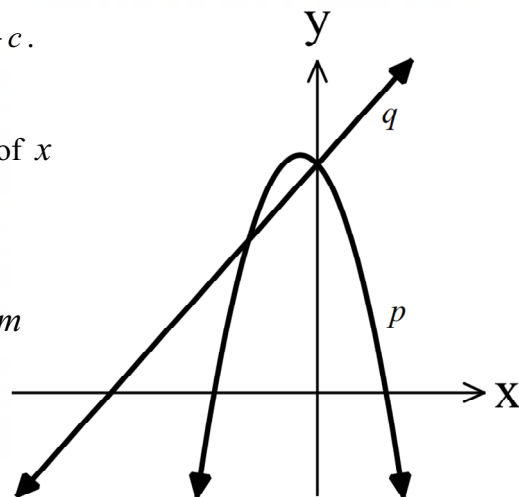
- 2.1 For what values of x is $\frac{f(x)}{g(x)} \geq 0$? (3)
- 2.2 For what value of p will $f(x) = p$ have two unequal, negative roots? (2)
- 2.3 Determine the maximum length of KL. (5)
- 2.4 Given $h(x) = -3x + k$. Determine the value of k if $h(x)$ is a tangent to $f(x)$. (5)

Reach for the stars

3. Given $p(x) = ax^2 + bx + c$ and $q(x) = mx + c$.

You are given that $\frac{q(x)}{p(x)} < 0$ for all values of x when $-6 < x < -3$ or $x > 2$.

Determine, showing working, the value of m in terms of a .



(5)



Finance

Non-negotiable

1. Calculate the original price of an iPad if the depreciated value after 3 years is R7 045,32.
The rate of depreciation is 13% p.a. based on the reducing balance method. (3)

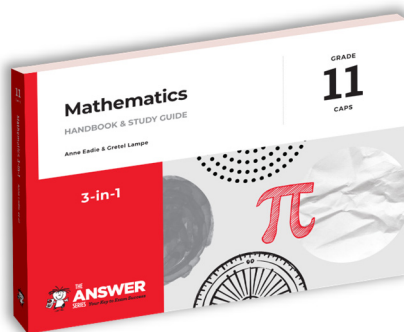


Take it up a notch

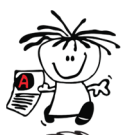
2. A woman made an initial investment of R10 000 into an account. Three years later she deposited R5 000 into the same account. She withdrew R8 000 five years after the initial investment. The interest rate was 8% p.a. compounded monthly for the first two years, and then it changed to 6,5% p.a. compounded quarterly after that. Determine the final amount in her account after six years. (5)

Reach for the stars

3. The income tax in South Africa is levied at a rate of $a\%$ for the first R488 700.
For any amount above R488 700 the rate is $(a + 5)\%$. A woman noticed her effective tax was $(a + 0,34)\%$ of her annual income. Determine her annual income. (5)



For further examples,
see pages 11.1 to 11.10 in the
Grade 11 Maths 3-in-1 Study Guide



Probability

Non-negotiable

1. 173 Grade 12's at a school were surveyed to see who took Mathematics (M), Life Sciences (L) and Geography (G).

- Every Grade 12 took at least one of these three subjects
- 110 take Mathematics
- 55 take Life Sciences
- 67 take Geography
- 20 take Mathematics and Life Sciences, but not Geography
- 11 take Mathematics and Geography, but not Life Sciences
- 16 take Life Sciences and Geography, but not Mathematics
- x take all three subjects



- 1.1 Draw a Venn diagram to illustrate the above information. (4)
- 1.2 Determine the value of x . (2)
- 1.3 Determine the probability that a student takes exactly one of these three subjects. (2)

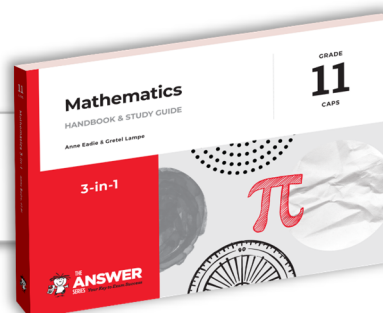
Take it up a notch

2. A bag contains three red marbles and x green marbles. Two marbles are pulled from the bag without replacement. The probability of getting one marble of each colour is $\frac{4}{7}$. Determine the value of x . (5)

Reach for the stars

3. A point $(x; y)$ is randomly picked inside a quadrilateral with vertices $O(0;0)$, $A(0;6)$, $B(4;6)$ and $C(10;0)$. What is the probability that $y \geq x$? (7)

For further examples,
see pages 12.1 to 12.19 in the
Grade 11 Maths 3-in-1 Study Guide



Data Handling

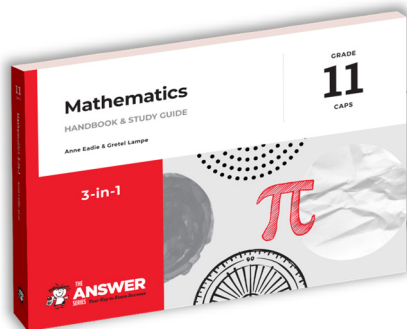
Non-negotiable

1. The table below shows the marks obtained by a Grade 11 class for a Maths test out of 50.

| Marks | Frequency | Cumulative Frequency |
|------------------|-----------|----------------------|
| $0 < x \leq 10$ | 3 | |
| $10 < x \leq 20$ | | 11 |
| $20 < x \leq 30$ | 15 | |
| $30 < x \leq 40$ | 10 | |
| $40 < x \leq 50$ | | 40 |



- 1.1 Complete the missing information in the table. (2)
- 1.2 Draw an ogive (cumulative frequency curve) representing the above information. (3)
- 1.3 Determine, using your ogive, the interquartile range. (3)
- 1.4 If 20% of the class failed the test, use the ogive to determine the pass mark. (2)



For further examples,
see pages 13.1 to 13.32 in the
Grade 11 Maths 3-in-1 Study Guide



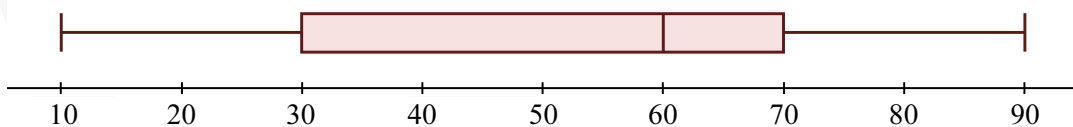
Take it up a notch

2. The marks obtained by 80 Grade 11 learners are shown below.

| Marks | Frequency |
|------------------|-----------|
| $10 < x \leq 20$ | 7 |
| $20 < x \leq 30$ | A |
| $30 < x \leq 40$ | B |
| $40 < x \leq 50$ | 4 |
| $50 < x \leq 60$ | 10 |
| $60 < x \leq 70$ | C |
| $70 < x \leq 80$ | 12 |
| $80 < x \leq 90$ | D |



A box and whisker plot is drawn of the data. No learner got exactly 30, 60, or 70 marks.



Determine the values of A, B, C, and D.

(4)

Reach for the stars

3. Eight numbers are written in ascending order.

5; x ; 13; 17; 21; 21; y ; 31



The mean of the numbers is 18 and the interquartile range is 11. Determine the value of x and y .

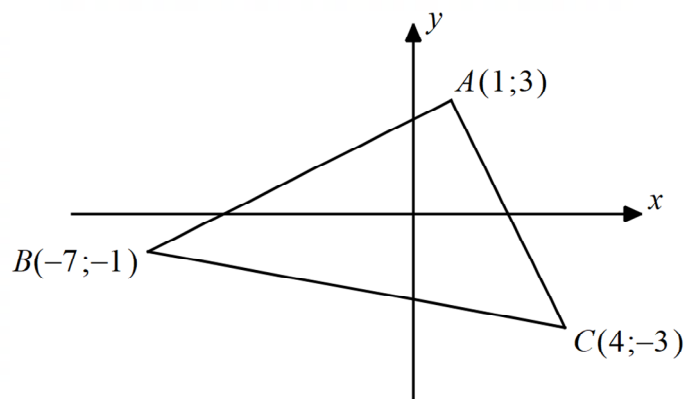
(7)



Analytical Geometry

Non-negotiable

1. In the diagram, $A(1;3)$, $B(-7;-1)$ and $C(4;-3)$ are given.



- 1.1 Determine the length of AB, in simplified surd form. (2)
- 1.2 Determine the co-ordinates of Q, the midpoint of BC. (2)
- 1.3 Determine the gradient of AB. (2)
- 1.4 Determine the equation of the line parallel to AB, passing through Q. (3)
- 1.5 Prove that $AB \perp AC$. (2)
- 1.6 Determine the co-ordinates of D if ABCD is a parallelogram. (2)

Take it up a notch

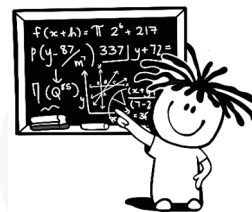
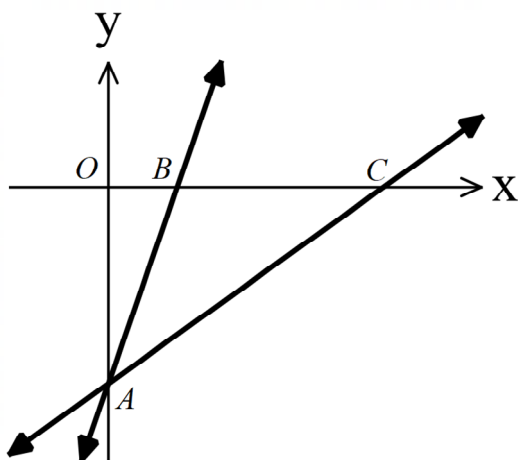


2. Use the diagram in question 1.
- 2.1 Determine the size of \widehat{ABC} , correct to two decimal places. (4)
- 2.2 P is a point on BC such that the area of $\triangle ABC$ is four times the area of $\triangle ABP$. Determine the co-ordinates of P. (2)



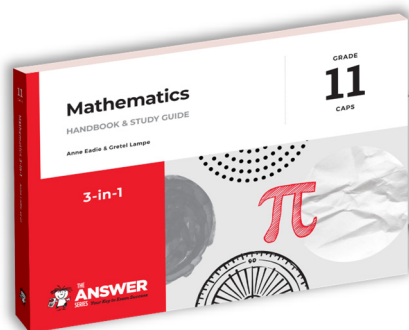
Reach for the stars

3. In the diagram, the equations of the two straight lines are $2y - x + 2q = 0$ and $y - 2x + q = 0$.



Determine the value of q if the area of $\triangle ABC$ is 48 units².

(6)



For further examples, see pages 5.1 to 5.15 in the **Grade 11 Maths 3-in-1 Study Guide**



Trigonometry

Non-negotiable

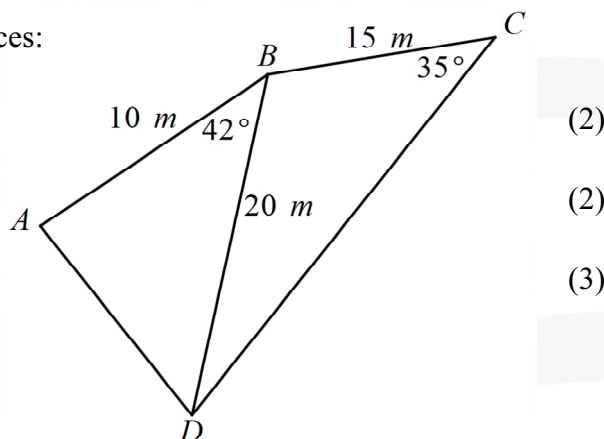
1. In the diagram, which is not drawn to scale, $AB = 10\text{ m}$, $BD = 20\text{ m}$, $BC = 15\text{ m}$, $\widehat{ABD} = 42^\circ$ and $\widehat{BCD} = 35^\circ$.

Determine, correct to two decimal places:

1.1 the area of $\triangle ABD$.

1.2 the length of AD .

1.3 the size of \widehat{BDC} .



(2)

(2)

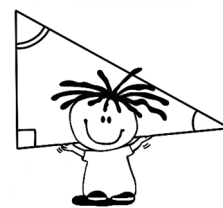
(3)

Take it up a notch

2. Solve for x , correct to two decimal places:

2.1 $27^{\tan x} = 9$; $x \in [-180^\circ; 360^\circ]$

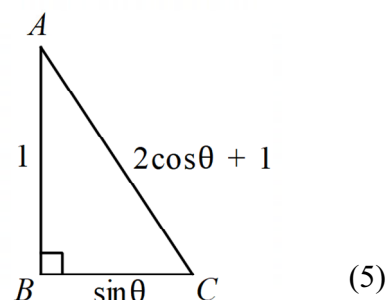
2.2 $2\sin^2 x - 6\sin x \cos x = 3\cos x - \sin x$. Give the general solution. (6)



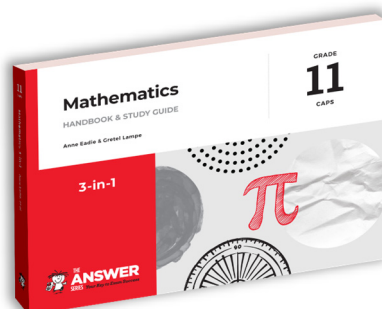
Reach for the stars

3. In the diagram, $BC = \sin \theta$, $AB = 1$ and $AC = 2\cos \theta + 1$.

Determine $\tan A$ without the use of a calculator.



(5)



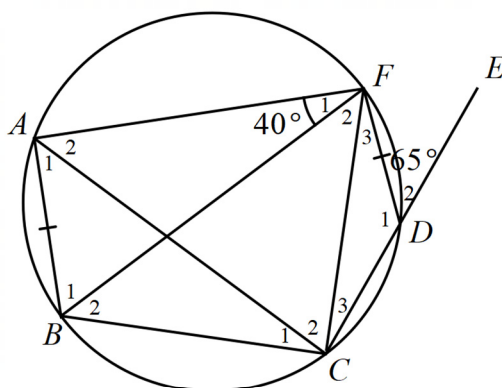
For further examples, see pages 6.33 to 7.24 and 10.1 to 10.17 in the **Grade 11 Maths 3-in-1 Study Guide**



Euclidean Geometry

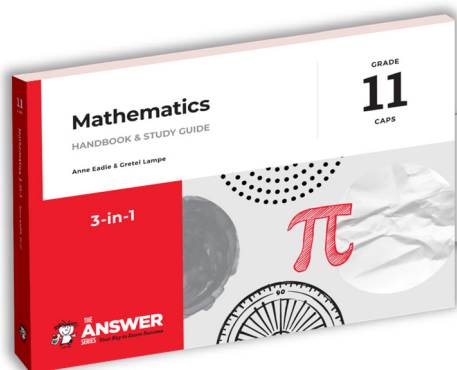
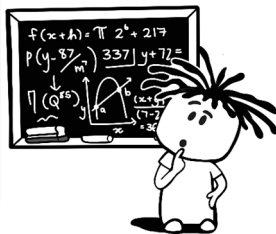
Non-negotiable

1. In the diagram, circle ABCDF has BF as a diameter. $\widehat{D}_2 = 65^\circ$, $\widehat{F}_1 = 40^\circ$ and $AB = DF$.



Determine the size of the following angles, giving reasons.

- | | | |
|-----|-----------------|-----|
| 1.1 | \widehat{BAF} | (2) |
| 1.2 | \widehat{B}_1 | (2) |
| 1.3 | \widehat{C}_1 | (2) |
| 1.4 | \widehat{C}_3 | (2) |
| 1.5 | \widehat{B}_2 | (2) |
| 1.6 | \widehat{F}_2 | (2) |



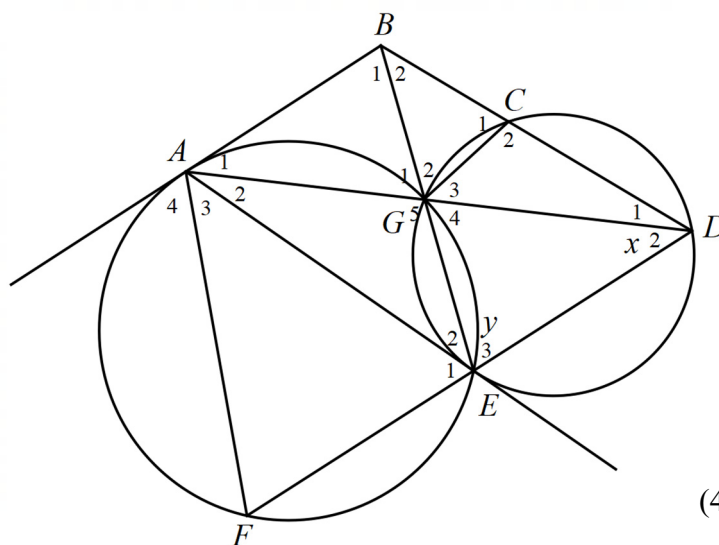
For further examples,
see pages 9.1 to 9.26 in the
Grade 11 Maths 3-in-1 Study Guide



Take it up a notch

2. In the diagram, AB is a tangent to circle AFEG at A. AE is a tangent to circle EDCG at E. BE and AD intersect at G. The two circles intersect each other at E and G.

$$\widehat{D}_2 = x \text{ and } \widehat{E}_3 = y.$$

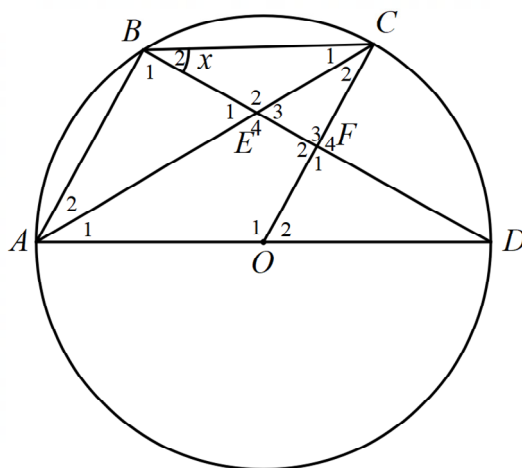


Prove that:

- 2.1 $DF \parallel BA$ (4)
- 2.2 AB is a tangent to circle BCG. (4)

Reach for the stars

3. In the diagram, A, B, C and D are points on a circle with centre O. OC intersects BD at F, the midpoint of chord BD. $\widehat{B}_2 = x$.



- 3.1 Prove that BC is a tangent to the circle that passes through A, B and E. (8)
- 3.2 Prove that $AB^2 = 4AO^2 - 4BC^2 + 4CF^2$ (4)

