AddvanceMaths.com

Year 10

Topics 1 - 12

Practice Exam

Mark Scheme and revision:
www.addvancemaths.com/year10

Name:	
Teacher:	
Score:	/91 %

1 Hour 50 min

Instructions

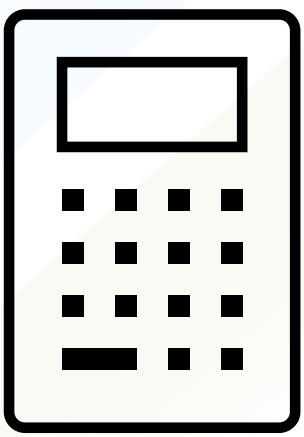
- Use black or blue ball-point pen.
- Answer all the questions in the spaces provided; blank paper is provided if needed.
- You will need: **ruler, protractor, pencil, compass, calculator**

Information

- The marks for each question are shown in brackets.
- The total marks available for this exam is 91.

Advice

- Read each question carefully before you start to answer it.
- Keep an eye on the time.
- Try to answer every question.
- Check your answers if you have time at the end.



Calculators are allowed in this paper.
AddvanceMaths recommends the Casio Classwiz fx-991

Designed by: Imad Raheel

Year 10 Topics 1-12 exam

Addvance

1. Solve the simultaneous equations below, giving your answer as a fraction where required:

(a) $5x + 7y = 22$ $\quad 2x - 3y = 32$

$\downarrow \times 2$ $\quad \downarrow \times 3$

$10x + 14y = 44$ $\quad 10x - 15y = 160$

$-\ 10x - 15y = 160$

$29y = -116$

$y = -4$

$2x - 3(-4) = 32$

$2x + 12 = 32$

$2x = 20$

$x = 10$

x = 10

y = −4 3

(b) $4x - y = 4$ $\quad 2x + \frac{7}{2}y = -10$

$\downarrow \times 2$

$4x + 7y = -20$

$-\ 4x + 7y = 20$

$-8y = -16$

$y = 2$

$4x - 2 = 4$

$4x = 6$

$x = 1.5$

x = 1.5

y = 2 3

2. Find an equation for x in terms of y;

$$\frac{2^7 \times 32^x}{8^{3y} \times 4} = 8$$

$\frac{2^7 \times (2^5)^x}{(2^3)^{3y} \times 2^2} = 2^3$

$\frac{2^7 \times 2^{5x}}{2^{9y+2}} = 2^3$

$2^{7+5x-9y-2} = 2^3$

$5 + 5x - 9y = 3$

$5x - 9y = -2$

$5x = 9y - 2$

$x = \frac{9y-2}{5}$

$x = \frac{9y-2}{5}$ 4

3. In a sale, all items are 35% off their original prices.

(a) Find the original price of a TV costing $273.13 in the sale.

$x \times 0.65 = 273.13$

$x = \frac{273.13}{0.65} = \$420.20$

$ 420.20 2

(b) Find the sale price of a toy which costed $45 before the sale discount.

$45 \times 0.65 = 29.25$

$ 29.25 1

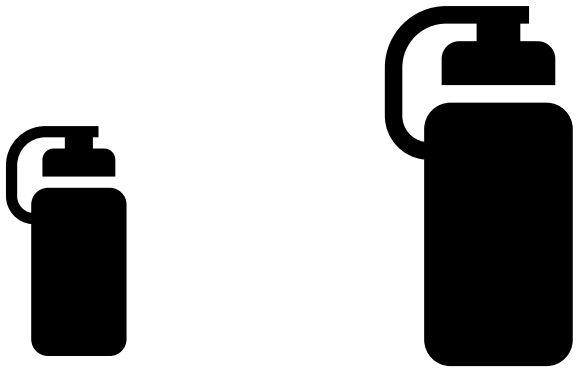
(c) Tom's credit card offers an additional 15% off the new price of any product in the sale as part of his membership.
If Tom buys a washing machine for $1105, what was the washing machine's original price before the sale?

$1105 = 0.65 \times 0.85 \times x$

$\frac{1105}{0.65 \times 0.85} = \$2000$

$ 2000 3

4. The volume of two similar water containers are in the ratio 27 : 64.



(a) Find the ratio of the heights.

27 : 64

3 : 4

3 : 4 1

(b) Find the surface area of the larger container, given that the smaller one has surface area 810 square cm.

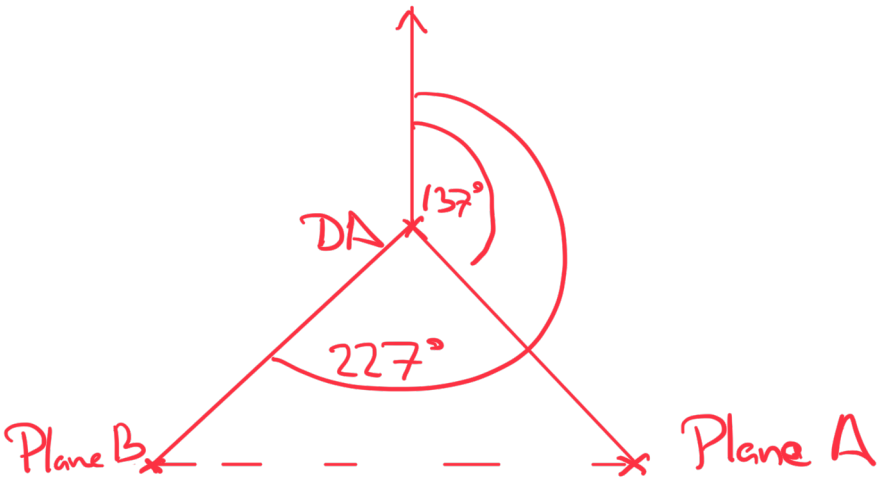
Area Scale Factor $= \left(\frac{4}{3}\right)^2 = \frac{16}{9}$

$810 \times \frac{16}{9} = 1440 \text{ cm}^2$

1440 ..... cm^2 3

5. At 16:00, Plane A is 137 degrees from Dubai airport, travelling at 300 km/h and scheduled to land at 16:20 .
Plane B is due west from Plane A, and 227 degrees from the airport.

(a) Draw an accurate diagram for the bearings in this situation.
The distances need not be accurate.



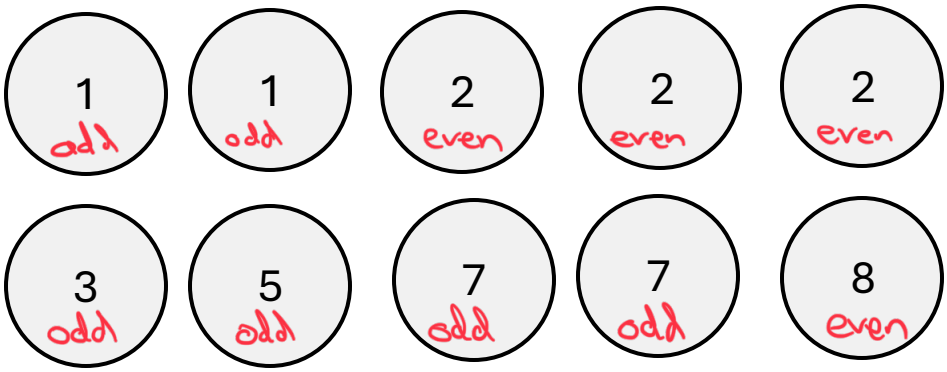
3

(b) Find the distance between the 2 planes, giving your answer to 3 significant figures if required.

$100^2 + 100^2 = d^2$

141 km 4

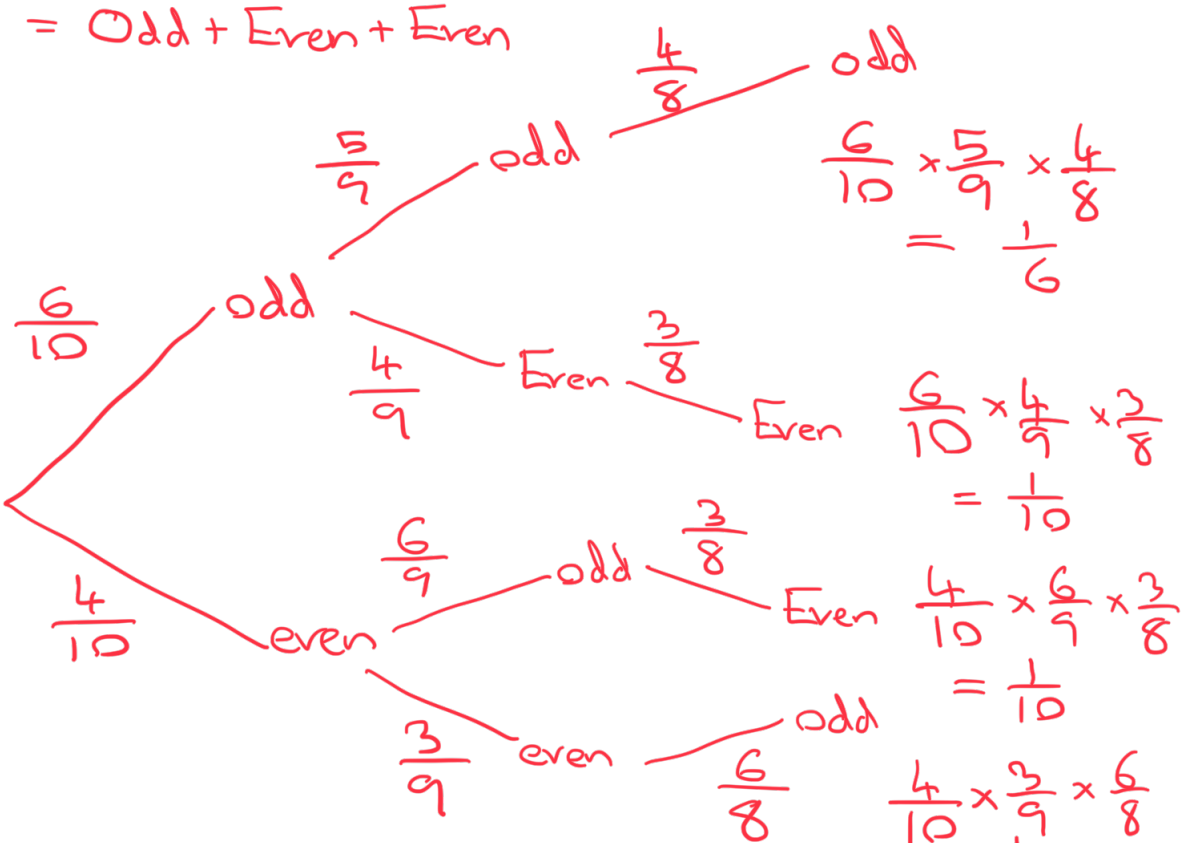
6. Tom has some counters in his bag, as shown below.



6 odd
4 even

He draws 3 counters at random.
Find the probability that the sum of the numbers on his obtained counters is odd.

Odd = Odd + Odd + odd
= Odd + Even + Even

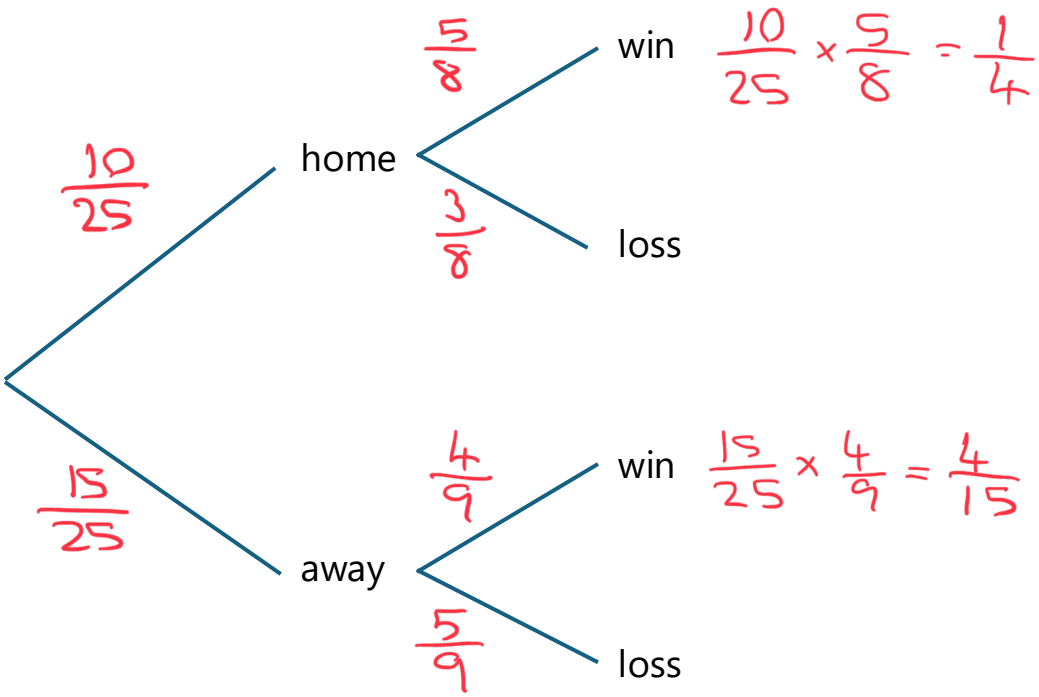


$\frac{1}{6} + \frac{1}{10} + \frac{1}{10} + \frac{1}{10}$
$= \frac{1}{6} + \frac{3}{10} = \frac{7}{15}$

..... $\frac{7}{15}$

7. In any given season, team A plays 25 matches, with 10 being scheduled at their home ground.
The probability that team A loses a game at home is 3/8.
The probability that team A wins a game away from home is 4/9.

(a) Complete the probability tree diagram



5

(b) Over the course of 12 seasons, how many matches is team A expected to win?

$P(\text{win}) = \frac{31}{60}$

$12 \times 25 \times \frac{31}{60} = 155$

155

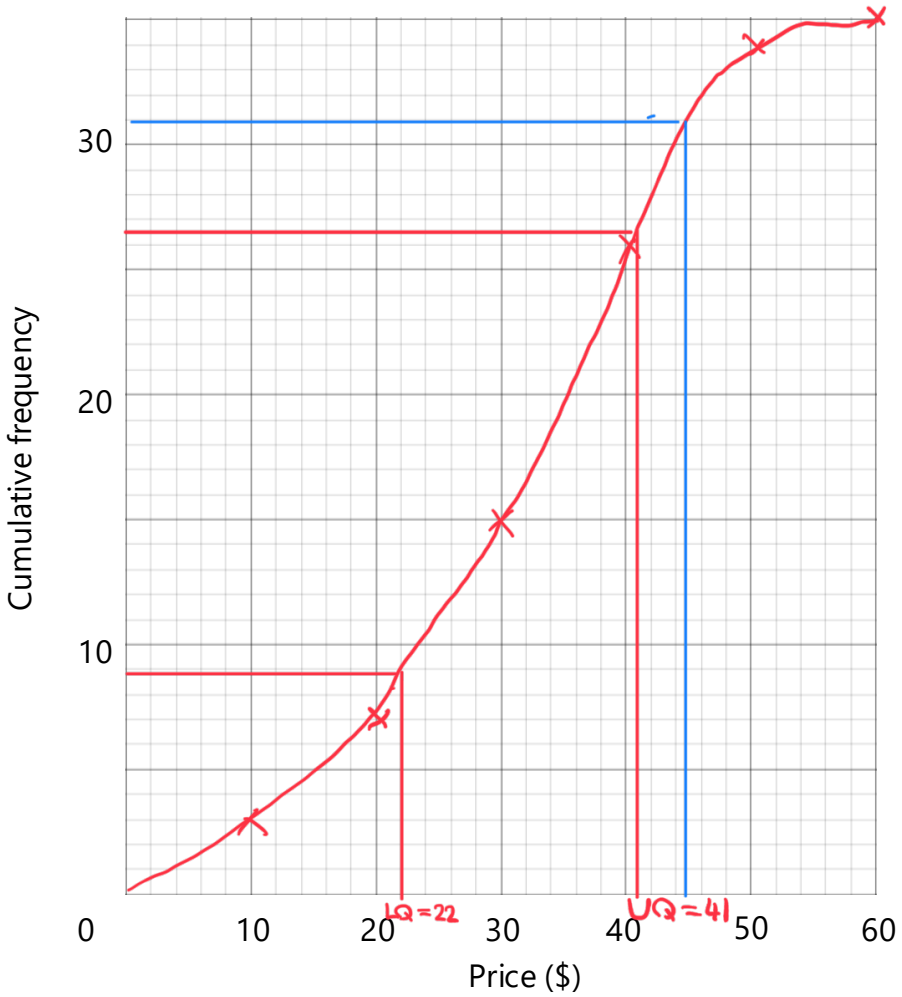
4

(c) The data for tickets sold versus price of tickets is shown below.

Price ($)	Tickets sold (100s)
$0<p\leq 10$	3
$10<p\leq 20$	4
$20<p\leq 30$	8
$30<p\leq 40$	11
$40<p\leq 50$	8
$50<p\leq 60$	1

Price ($)	Tickets sold (100s)
$0<p\leq 10$	3
$0<p\leq 20$	7
$0<p\leq 30$	15
$0<p\leq 40$	26
$0<p\leq 50$	34
$0<p\leq 60$	35

Using this information, plot a cumulative frequence graph.
The graph is on the next page



4

(d) Find the interquartile range

35 ÷ 4 = 8.75

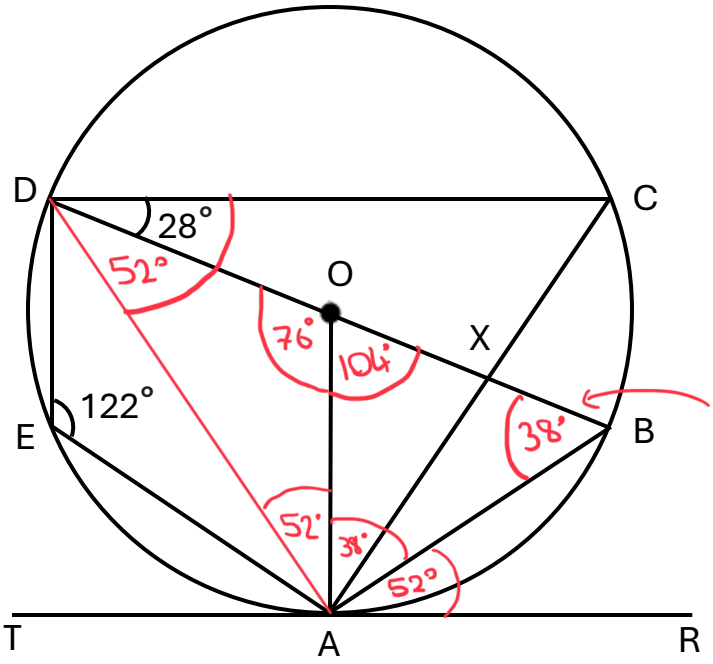
LQ = 22
UQ = 41
IQR = 41 − 22
= 19

IQR = 19 3

(e) How many people paid over \$45?

31 2

8. In the figure, TAR is the tangent at A to circle ABCDE, which has centre O.
The chord AC intersects the diameter BOD at X.
Angle AED is 122° and angle BDC is 28°.



Opposite Angles in a Cyclic Quadrilateral sum to 180°.

Find, giving reasons for each stage of your working;

(a) Angle BAR

Angles in an Isosceles Triangle.
The angle between a radius and tangent is 90°. 90° − 38° = 52°

52° ..... ° 4

(b) Angle ADC

Angles in a triangle sum to 180°.
Isosceles Triangle. $\frac{180-76}{2} = 52°$

80 ..... ° 4

9. Expand the following.

(a) $(3x + 4)(2x - 5)$

$6x^2 - 15x + 8x - 20$

$= 6x^2 - 7x - 20$

$6x^2 - 7x - 20$ 2

(b) $(2a - 3b)(4a + 5b)$

$= 8a^2 + 10ab - 12ab - 15b^2$

$= 8a^2 - 2ab - 15b^2$

$8a^2 - 2ab - 15b^2$ 2

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

$= (3x+2)[x^2 + x - 2]$

$= 3x^3 + 3x^2 - 6x + 2x^2 + 2x - 4$

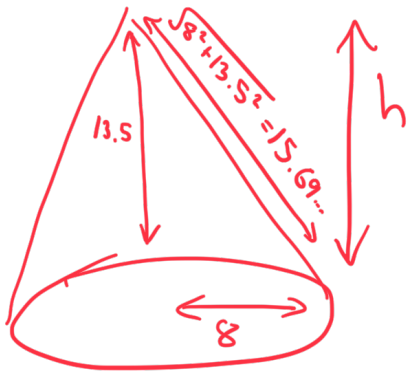
$= 3x^3 + 5x^2 - 4x - 4$

$3x^3 + 5x^2 - 4x - 4$ 3

10. An aluminium sphere with radius 6 cm is melted down and all the aluminium is used to create a cone with radius 8 cm and height h cm. Show whether the surface area of the sphere and the cone is different or not.

$V_s = \frac{4}{3}\pi(6)^3 = 288\pi \text{ cm}^3$ $S_{AS} = 4\pi(6)^2 = 144\pi$

$= 452.389$



$S_{AC} = \pi r^2 + \pi r($

$= \pi(8)^2 + \pi(8)(15.69)$

$= 64\pi + 394.391$

$= 595.45... \text{ cm}$

$V_c = 288\pi = \frac{1}{3}\pi r^2 h$

$288 = \frac{1}{3}(8)^2 h$

$13.5 = h$

$452.38 \text{ cm}^2 < 595.45 \text{ cm}^2$

The surface areas of the shapes are different.

11. Simplify the following, giving your answer in its simplest form.
Show all your working

(a) $\dfrac{4x^2-9}{2x^2+7x+6}$

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

$= \dfrac{2x-3}{x+2}$

$\dfrac{2x-3}{x+2}$ 3

(b) $\dfrac{3x^2+7x-6}{x^2-x-6} \div \dfrac{2x^2+5x-3}{x^2-9}$

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

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

$\dfrac{(3x-2)(x+3)}{(x+2)(2x-1)}$ 5

Format

12. The line y = px+q is perpendicular to the line 2x + 8y = 148 .
The lines intersect at the point (2,r).
Find the values of p, q and r.

$2x + 8y = 148$

$x + 4y = 74$

$4y = -x + 74$

$y = -\frac{1}{4}x + \frac{37}{2}$ ← (2,r)

$r = -\frac{1}{4}(2) + \frac{37}{2}$

$r = -\frac{1}{2} + \frac{37}{2} = \frac{36}{2} = 18$ (2,18)

$y = px + q$

$y = 4x + q$

$18 = 4(2) + q$

$18 = 8 + q$

$q = 10$

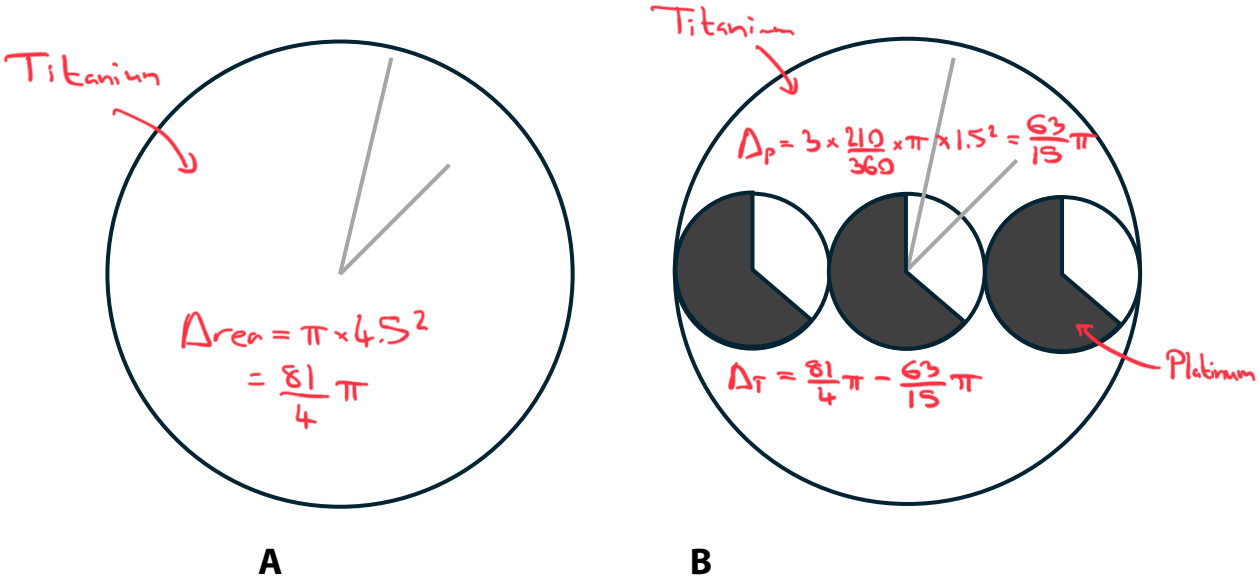
Decapitalise

P = 4

Q = 10

R = 18

13. Two congruent circular watch faces are shown.



Watch A is entirely made of titanium.

Watch B has an additional three identical circular regions. These are made of a 210° sector made of platinum, with the rest made of titanium.

The diameters of the platinum regions lie on the same straight line, which is also the diameter of the watch face. The diameter of both large watch faces is 9 cm.

The cost per square centimetre of platinum and titanium is in the ratio 5:3, respectively.

P:T
5x : 3x

Calculate the ratio of the total manufacturing costs of watch A to watch B in the form $1:n$, giving n to 3 significant figures if necessary.

Cost A

$\frac{81}{4}\pi \times 3x$

$= \frac{243}{4}\pi$

Cost B

$\left(\frac{81\pi}{4} - \frac{63}{15}\pi\right) \times 5x + \frac{81}{4}\pi \times 3x$

$= 141\pi$

Cost A : Cost B

$\frac{243}{4} : 141\pi$

$243 : 564$

$1 : \frac{564}{243}$

$1 : 2.32$ ✓

The answer space is on the next page

1 : 6

---------- END OF EXAM ----------

Total marks available: *91*

Remember to re-check your answers

Blank Paper

Use this page and the next for extra space if needed.
Please clearly specify the question number.

Blank Paper

Post-exam reflection sheet

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Q	Marks	What Went Well?	Even better if
1			
2			
3			
4			
5			
6			
7			
8			
9			
10			
11			
12			
13			

Self-reflection

How did you revise for the exam? *(tick all that you did)*

- Reading class notes
- Online practice
- Doing practice question
- Getting help from your teacher
- Recapping the previous exam
- Study group (with friends)
- Reading textbooks
- Watching videos

Were these revision techniques useful? *(circle your answer)*

 Yes

 A bit

 No

How could you revise more effectively next time?

_____

_____

List three topics from this test that you are good at, and three that need more work

1.

2.

3.

4.

5.

6.

"Failure is the stepping stone to success"

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