Secondary 2 WA3 Mock Exam

Hello my beloved Sec 2s!

Dylan here!

I have created these mock tests for y'all as I found out that I had lack of practice questions when I was in Secondary School.

The difference in the standards between the homework and test questions are way too different.

When my students sit through a Mock Exam prior to their tests, they get use to the time pressure, and they get exposed to the level of the exam questions.

That is the reason why they score really well.

I have a strong desire to help as many students as possible in this community and I want you guys to perform to your best ability.

That is why I want to share these resources with everyone here.

I have purposefully selected questions that cover different scopes in the chapters.

Yes! If you can do these questions, you can certainly do well in your WA3!

Take this test in a quiet environment.

Answers are included at the back, so please don't refer :)

Jiayou!

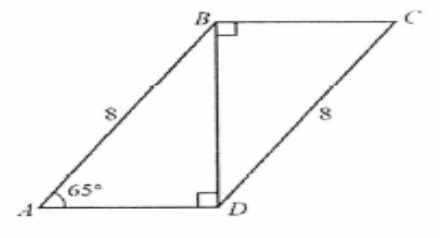
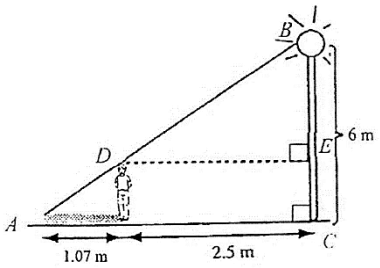
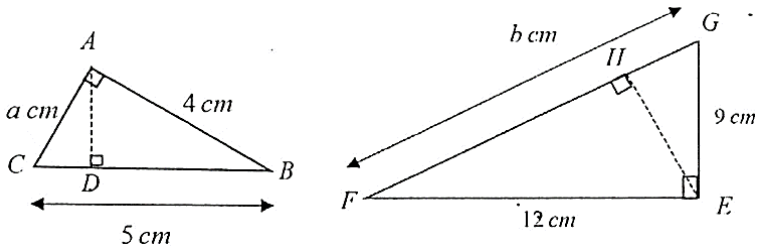
Love,

Dylan

Proportions

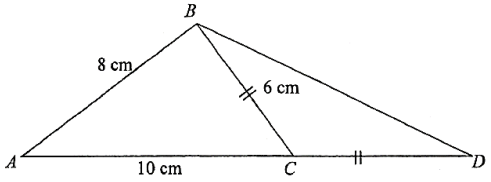
1	The volume of a ball, V cm^3, is directly proportional to the cube of its radius, r. When $r = 7.5. V = 562.5\pi \text{cm}^3$ **(a)** Find the equation connecting V and r. Give the value of k, the constant, in terms of π. [2] **(b)** Calculate the value of V when $r = 9$, giving your answer in terms of π. [2]
2	13 students working 7 hours a day can complete a project in 40 days. How many days will 8 students working 5 hours a day need to complete the same project? [3]
3	y is an inversely proportional to the square of x. Given that $y = 10$ for a particular value of x, find the value of y when this value of x is halved. [3]
4	The amount of fertilizer that is absorbed by a plant, F, is directly proportional to the square root of the height increment of the plant, h. When the plant absorbs 1 ml of the fertilizer, the height increment of the plant is 0.0625 cm. Calculate **(a)** the amount of fertilizer needed for the plant to grow by 9 cm, [2] **(b)** the height increment of the plant when 3 ml of fertilizer is absorbed. [3]

Congruency & Similarity

1	In the diagram below, it is given that $AB = DC = 8$ cm, $\angle CBD = \angle ADB = 90°$ and $\angle BAD = 65°$. Given that $\triangle CBD$ and $\triangle ADB$ are congruent, find reflex $\angle ADC$. [2] 
2	A man is standing at a distance of 2.5 m away from a lamp post with a height of 6 m. The length of the man's shadow is 1.07 m. Using the concept of similar triangles. find the man's height, correct to 1 decimal place. [3] 
3	In the following diagram, triangle *ABC* is similar to triangle *EFG*.  **(a)** Calculate the scale factor that enlarges triangle *ABC* onto triangle *EFG*. [1] **(b)** Calculate the value of *a* and *b*. [2] **(c)** Triangle *ABC* and triangle *EFG* can be scaled up to form a larger similar triangle *IJK*. **(i)** Find scale factor *X* (for triangle *ABC*) and scale factor *Y* (for triangle *EFG*) which maps each triangle onto the smallest possible triangle *IJK* if *X* and *Y* are integers.' [3] **(ii)** Find the perimeter of triangle *IJK*. Answer the whole of this question on a single sheet of graph paper. [2]

Pythagoras Theorem & TOA CAH SOH

1 In the diagram, $AB = 8$ cm, $AC = 10$ cm, $BC = 6$ cm, $BC = CD$ and ACD is a straight line.

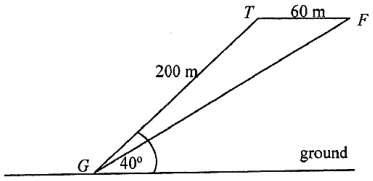


(a) Explain why $\angle ABC$ is a right angle. [2]

(b) Without finding any angle, find the arca of ΔBCD. [2]

(c) Write down exact value of cos $\angle BCD$. [1]

2 Noah went kite flying at Marina Bay. He stands at position G on the ground and releases 200 m of string to fly the kite to position T. The string GT makes an angle of 40° with the ground.

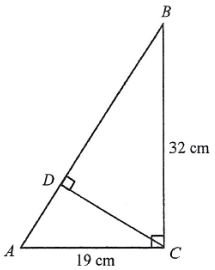


(a) How high is the kite vertically above the ground assuming that the string is taut? [1]

(b) The wind becomes stronger and the kite is carried 60 m horizontally further away from point T to point F. Noah releases more string, maintaining the height of the kite above the ground. Calculate the length of the string GF. [3]

(c) Calculate the angle that the string GF now makes with the ground. [2]

3 In the diagram, ABC is a right-angled triangle and ADB is a straight line. It is given that $BC = 32$ cm, $AC = 19$ cm and $\angle BDC = 90°$.



Find

(a) $\angle DBC$, [2]

(b) DC. [2]

Answer Key

Proportions

<table>
<tr><td>1</td><td>(a) $V = kr^3$
When $r = 7.5. V = 562.5\pi.$
$562.5\pi = k(7.5)^3$
$k = \dfrac{562.5\pi}{7.5}$
$k = \dfrac{4}{3}\pi$
$V = \dfrac{4}{3}\pi r^3$
(b) $When\, r = 9,$
$V = \frac{4}{3}\pi(9)^3$
$= \dfrac{4}{3}\pi(729)$
$= 972\pi\ cm^3$</td></tr>
<tr><td>2</td><td>13 students → 7 × 40 = 280 hours
1 student → 280 × 13 hours
8 students → (280 × 13) ÷ 8 = 455 hours
No. of days = 455 ÷ 5 = 91 days</td></tr>
<tr><td>3</td><td>$y = \dfrac{k}{x^2}$
when $y = 10, 10 = \dfrac{k}{x^2}$
new $y = \dfrac{k}{\left(\frac{x}{2}\right)^2} = \dfrac{4k}{x^2}$
$= 4 \times 10 = 40$
$y = \dfrac{k}{x^2}$
when $y = 10, k = 10x^2$
new $y = \dfrac{k}{\left(\frac{x}{2}\right)^2} = \dfrac{4k}{x^2}$
$= \dfrac{4 \times 10x^2}{x^2}$
$= 4 \times 10 = 40$</td></tr>
<tr><td>4</td><td>(a)
$F = 4\sqrt{h}$
when $F = 3$
$3 = 4\sqrt{h}$
$h = (0.75)^2$
$= 0.5625$ cm
(b)
$F = k\sqrt{h}$
$1 = k\sqrt{0.0625}$
$k = 4$
$\Rightarrow F = 4\sqrt{h}$
when $h = 9$
$F = 4\sqrt{9} = 12$ ml</td></tr>
</table>

Congruency & Similarity

1

$\angle BDC = \angle ABD = 180° - 90° - 65°$

$= 25°$ ($\angle$s of congruent figures)

Reflex $\angle ADC = 360° - 90° - 25° = 245°$

2

Let the height of the man be x.

$\frac{2.5}{1.07+2.5} = \frac{6-x}{6}$

$6(2.5) = (6-x)(3.57)$

$21.42 - 3.57x = 15$

$-3.57x = -6.42$

$x = 1.8$ (1 d.p.)

The man's height is 1.8 m.

OR

$\frac{1.07}{2.5+1.07} = \frac{CE}{6}$

$CE = \frac{6(1.07)}{3.57}$

$CE = 1.8$ (1 d.p.)

The man's height is 1.8 m.

OR

$\frac{2.5}{2.5+1.07} = \frac{BE}{6}$

$BE = \frac{2.5}{3.57} \times 6$

$BE = 4.201680672$

$6 - 4.401680672 = 1.798319328 \approx 1.$

3

(a)

Scale factor

$= \frac{EF}{AB}$

$= \frac{12cm}{4cm}$

$= 3$

(b)

$a = 9 \div 3 = 3$

$b = 5 \times 3 = 15$

(c) (i)

$AB : EF$

$4 : 12$

$1 : 3$

LCM = 3

Next lowest common multiple = 6

$\therefore X = 6$

$Y = 6 \div 3 = 2$

(ii)

Award for correct method for multiplying perimeter of triangle ABC or triangle EFG by corresponding scale factors.

Perimeter = Perimeter of ABC × Scale Factor X

$= (3 + 4 + 5)$ cm $\times 6$

$= 72$ cm

Pythagoras Theorem & TOA CAH SOH

1	**(a)** Since $6^2 + 8^2 = 10^2$, by converse of Pythagoras Theorem, ABC is a right angle triangle, angle ABC is a right angle.	**(b)** Area = $\frac{1}{2}(6)(6)\frac{4}{5}$ = 14.4	**(c)** $\cos \angle BCD = -\frac{3}{5}$
2	**(a)** Let h be the height of kite above ground $\sin 40° = \frac{h}{200}$ $h = 200\sin 40°$ $h = 129$	**(b)** Let X be a point directly below T $\cos 40° = \frac{GX}{200}$ $GX = 200\cos 40°$ $GF^2 = (200\cos 40° + 60)^2 + (200\sin 40°)^2$ $GF = 248.97 \approx 249$	**(c)** Let θ be the angle that GF makes with string $\tan\theta = \frac{200\sin 40°}{200\cos 40° + 60}$ $= tan - 1 \frac{200sin40°}{200cos40° + 60}$ $= 31.1°$
3	**(a)** $\tan \angle DBC = \frac{19}{32}$ $\angle DBC = 30.7°$	**(b)** $\sin 30.70 = \frac{DC}{32}$ $DC = 16.3$ cm	