

5. Calculate the minimum length of side and the number of infantry required to defend an isolated square redoubt, under the following conditions—The garrison to consist of two ranks for each of three faces, single rank for the rear or south face, with a reserve of 1-6. One gun at the centre of west side, another at the north-east angle. A traverse, occupying 100 superficial feet covering the entrance in the centre of the south side. Draw the magistral line and foot of banquette. Supposing the top of your paper to be north. Width of banquette 12½ feet for double, and 11 feet for single rank. Of the interior space, 15 superficial feet must be allowed for each infantry soldier; for each gun, including gunners, and ammunition and stores, 600 superficial feet.

State the algebraic equation you deduce from the above data, and work out the answer

6. Draw to scale 1-120 the profile of an ordinary field work, with sufficient thickness of parapet to resist rifled field guns. The ditch in front to be only sufficient to provide earth for a glacis (if necessary), determined by the line of fire from the superior slope. The work is to be defended to as great a distance in rear as the amount of excavation for a parapet with 6 feet Command will admit. The enemy's fire descending one in five from high ground in front calculate the "remblai" and "deblai" by reducing the profile to a triangle geometrically.

7. What was the effect of curved artillery fire on the casemates of Fort Issy, Paris?

8. Do you think an application of the Moncrieff system, with a different disposition of casemate cover, would meet the requirements of modern war? Draw a rough profile of a work suitable to this country having due regard to economy and the materials available.

9. How have modern weapons affected the defences of Quebec, and what modifications or additions would you consider necessary?

PRactical GEOMETRY.

1. Construct an angle of 30 deg., by means of the protractor.

2. Bisect a given angle.

3. Raise a perpendicular from a point near the end of a given line.

4. Let fall a perpendicular on a given line from a point below the centre.

5. Describe the practical way of constructing a right angle, with ut instruments.

6. From a given point on a given line, draw a line having a fall of 1-6.

7. Divide a given line into five equal parts.

8. Construct a section of a field work from the following dimensions:

- Command, 5'
- Thickness of parapet, 18'
- Interior slope, 4-1.
- Superior slope, 1-6.
- Exterior slope, 1-1.

9. Construct a triangle equal in area to the above section.

FORTIFICATION, &c., AND FIELD ENGINEERING.

1. In making hasty defences in a village, what building would you select as a general rule?

2. With the aid of rough sketches, describe how you would place a stone or brick house in a state of defence, and which you would select; time for preparation being short?

3. You are required to span the broken

arch of a bridge blown up by the enemy. Pine trees being at hand, described with the aid of a sketch how you would utilize such forest timber in the construction of a slot bridge for field artillery, no nails being at hand. State the approximate mean diameter of the timber necessary, the distance apart of the sleepers, and the weight of a 9 pound M. L. rifled gun, carriage, and limber complete.

4. You are required to blow down a stockade gate protected from Artillery fire Supposing the only means at hand were such as could be obtained from of field battery, and the only troops available to cover the approach and assault were the infantry Escort of the battery, what disposition would you make?

5. Into how many reliefs are working parties divided?

6. Describe the method of arranging the working party, and commencing the first parallel of a siege; also the principles that guide the direction of the first approaches.

7. Describe the flying sap, and with a sketch the method of arranging working parties with arms, commencing a parallel by it.

8. Sketch the double sap, shewing the work of the different squads?

GUNNERY.

1. What is meant by the terms long and short radius in sighting ordnance?

2. Define the following terms:

- Plane of fire.
- Angle of descent.
- Angle of incidence.
- Angle of elevation.

3. Describe the operation of sighting an S. B. gun.

4. Describe the method of laying a gun by the quarter sight.

5. Give rules for calculating length of fuze for the following:—

- Mortar, Large.
- " Small.
- S. B. Common.
- S. B. Shrapnel.
- B.L.R. 9 Sec., Common.
- " " Shrapnel.

6. With the 7" B. L. R. gun at 1500. yds. you find the projectile falls 3 feet to the right, what deflection will be necessary to compensate for the error?

7. Why has the 7" B.L.R. gun a constant deviation to the right, and what is the compensating angle?

8. Within what limits should rifle and S. B. Shrapnel be burst, respectively?

9. Between what ranges and for what objects are the following S.B. projectiles effective.

- Case Shot.
- Grape.
- Common Shell.
- Shrapnel.

ARTILLERY MATERIAL.

1. Describe a sec. time fuze, B. L. R. state the difference between it and the 9 sec. M. L. R. fuze, why is it necessary to have a different fuze for B. L. and M. L. guns.

2. What is meant by the terms uniform and increasing twist in M. L. R. guns, what difference is there in the projectiles for each and why is it necessary?

3. What stores should not be placed in a magazine?

4. To what is the onward motion of a rocket due, what produces rotation in Hales rockets.

5. If you were out of friction tubes and port fires, how would you make substitutes?

6. Describe the method of making up cartridges, for S.B. and B.L.R., guns respectively.

7. If the end of the barrel of a 7" B.L.R. gun was worn away by heavy firing, so that the vent piece would not fit accurately, how would you repair it?

How are guns marked after venting, what is the limit for the through gauge when it would it be necessary to revent a gun?

SHIFTING ORDNANCE, &c.

1. A gun has to be moved a short distance out of battery, the woodwork of the standing garrison carriage having been destroyed by a shell, there are no appliances, but handspikes, and drag ropes, what expedient would you resort to?

2. Detail the stores necessary and give a description of the method of shifting a gun from one garrison standing carriage to another by slewing.

3. A 24 L. gun 50 cwt, is suspended from a gyn, the end of the fall made fast to the windlass, what is the strain on the shackle bolt?

4. What are the general duties of a detachment at shifting ordnance without a gyn.

5. Detail the duties of a detachment at gyn exercise.

6. Show by a sketch the position of each number putting a gyn together.

T. B. STRANGE, Lieut.-Colonel,
Commandant G. S., Quebec.

Mr. Goschen, First Lord of the Admiralty has submitted to the House of Commons the British naval estimates for the ensuing fiscal year. They exceed those of last year by \$1 702,880. His statement showed that on the first of January, 1873, the navy in commission comprised 160 steamships and vessels, including yachts, tenders, and gunboats, mounting 1,283 guns, and manned by 28,371 officers, men, and boys, and sixty-four sailing ships and vessels (including twenty-five coastguard tenders), mounting 439 guns, and manned by 4,597 officers, men, and boys; giving a grand total of 224 ships and vessels, mounting 1,722 guns, manned by 33,328 officers, men, and boys. Six vessels have been completed during the past quarter, and there are twenty others in course of construction or finish at the various government dockyards and by private firms of shipbuilders.

The Spanish army, says the *Natal and Military Gazette*, appears to be now utterly demoralized. In Catalonia the men seem to have everything their own way, have little duty to do, and do it or not as they think proper. The superior officers are trying all they can to restore order in parts where it has not been so completely disturbed. At Valladolid on the occurrence of some unpleasant symptoms, Gen. Ripoli held an imposing review, and ended by addressing the troops in the most earnest terms, imploring them not to forget their duty to the country, but his appeal did not have much effect. General Contreras is trying to quell the insubordinate spirit of his own army, to which the demagogues had done most evil. A battalion sent into Lerida to fight against the Carlists refused to obey their officers, and disbanded declaring that all compulsory service was at an end since the proclamation of the Republic. In short, matters are so bad that it seems very doubtful if the army could now be got to face a foreign invader.